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No. 2318.—Vol. L.

LONDON, SATURDAY, JANUARY 24, 1880.

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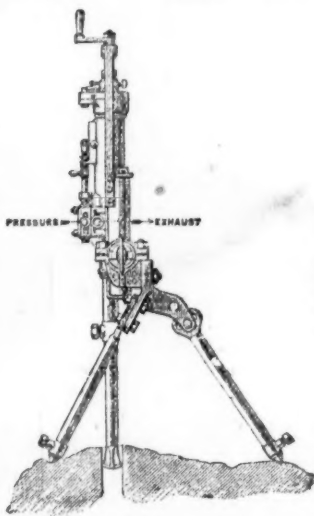
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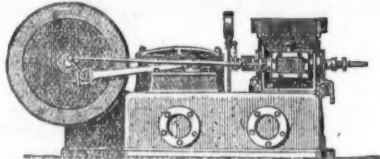
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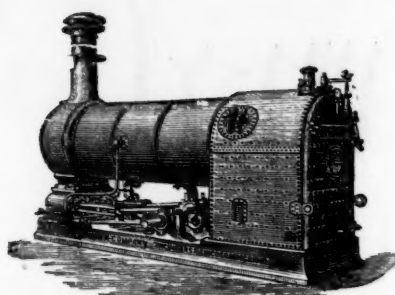
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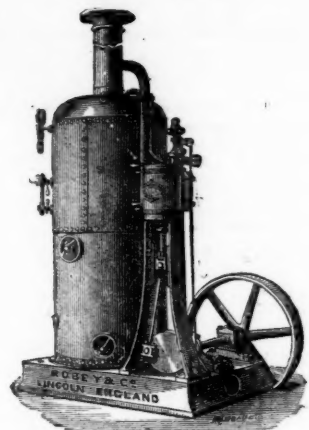
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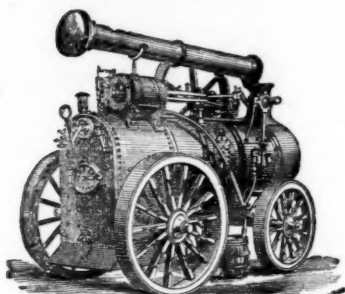
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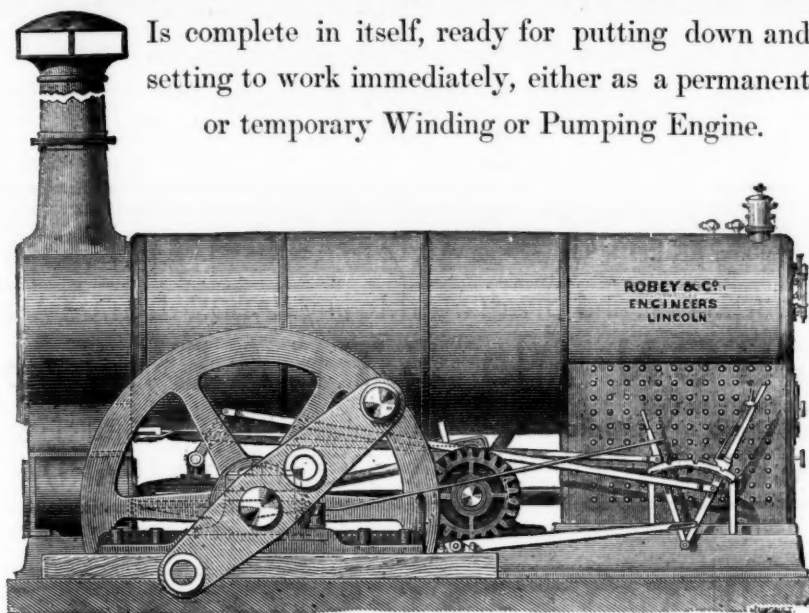
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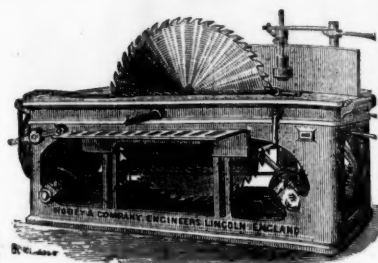


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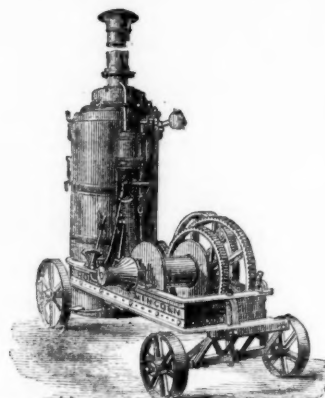
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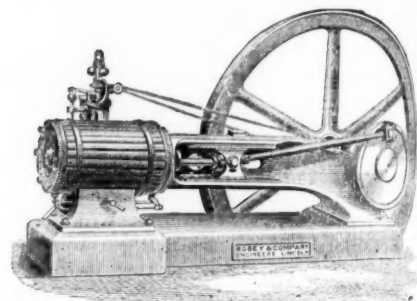
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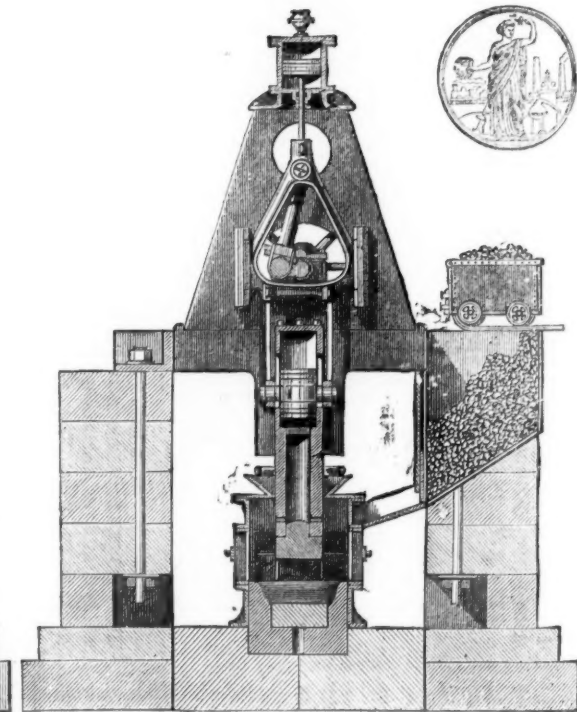
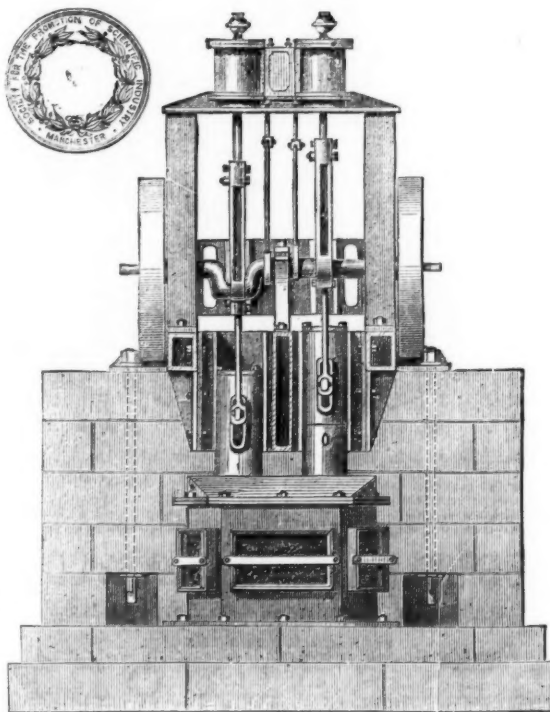
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## Original Correspondence.

## THE LEAD TRADE.

SIR.—The *Mining Journal* of Jan. 10 contained an article on Leadville, wherefrom it may be inferred that the region is capable of so flooding both America and Europe with lead as to render enterprise in the British Isles a far from remuneratively hopeful engagement, provided the lead area at Leadville is as extensive as it is rich, and the argentiferous ore there contains (say) 60 per cent. of lead, and the fuel requisite for the conversion of the ore into metallic lead and the cost of separation of silver and transit to the seaboard be not inordinate, and lastly, the quality of the lead be suitable either for conversion into white lead, or sheets or pipes.

Will your correspondent kindly give some information embracing the points referred to, and oblige your—  
NORTHERN READER.

## STEAM-BOILERS.

SIR.—On account of the growing interest evinced in the subject of boiler explosions and inspection of them the writer proposes to give a brief description of some of the typical forms of boiler now in use in this country, and to glance at the system of boiler inspection as now in operation. It is generally known that above 50 explosions occur every year in the United Kingdom, which prove fatal to 60 or more persons, whilst upwards of 100 are severely injured. It is clear that the management of steam-boilers is not yet sufficiently understood, and that the care of them is often delegated to unskilful men. But boiler explosions occur not only with those in the care of private firms or individuals, but also with those under the inspection of boiler insurance companies. Within the past six months three explosions have occurred where the boilers were inspected and insured by one or other of the insurance companies, so that we are almost at a loss what conclusion to arrive at, or what remedy to suggest, in mitigation of the evil. From what has been said it is evident that some additional security is required by the public from the consequences of these disasters, for where one or more boilers are situated in a populous neighbourhood the explosion of any one of them may deal destruction and injury to other persons than those immediately connected with the works on which the boiler is placed.

Of late it has frequently been asserted that it has been found difficult to obtain a thorough inspection of boilers, owing to the indifference or opposition of the owners to put them into the state in which both the interior and exterior of the boilers are accessible and convenient for inspection; the blame in such a case is thus removed from the inspector to the owner of the boiler. It is clear that such a system is very unsatisfactory, giving rise to a feeling that neither party is responsible for the accident, and it would be well if legislative enactments were brought into force to put an end to such an irresponsible state of matters. If the insurance companies had been more successful than they have been, and as we expected they would have been, in preventing boiler accidents, the force of public opinion would before this have caused compulsory inspection to be put in practice. Compulsory inspection, the owners having the right to choose their own independent inspection, combined with an official enquiry after accidents, as in the case of railways, is considered by competent authorities to be an effectual means of dealing with the question, and of introducing a better system into the methods of boiler management.

The writer may advert to the Halifax boiler explosion, which occurred on October 9, 1879, as an instance of mismanagement, which it is probable will arouse the public to the necessity of legislative action. By this accident six persons were killed, one being a partner in the works. The boiler was one of a range of four erected in 1871, each being 30 ft. in length, and 7 ft. in diameter. The boiler was fired under the shell, with two interior flues 2 ft. 7 in. diameter, connected by a U-shaped piece at the front end, the ignited gases entering at the back end of the tube, and returning through it to the other or exit end to the chimney. The steam pressure was 45 lbs. per square inch. The explosion was accounted for in the weakness of the ends, owing to their insufficient staying. It is remarkable that an external examination of the boiler should have been made only a few days before the accident, the last internal inspection of the group having been made as far back as 4½ years, though they were insured, and placed under the charge as to inspection of a Manchester insurance company. The latter adduced as a reason for this neglect the difficulties thrown in their way when they required an internal inspection by their officer.

To obtain a degree of safety in the generation of steam in boilers it is thought that a departure from the old forms will secure better results. The Cornish boiler with one flue and the double flued boiler have supplanted to a great extent the old cylindrical form; but though the flued boilers possess considerable advantages over the cylindrical in some respects, it cannot be said that there is in practice much gain in their freedom from explosion. On account of the excessive length of all these horizontal boilers, the large contents of water in them to be heated, and the difficulty of properly examining the flued boilers, new forms of boilers are being introduced.

The principle of the sectional or water tube boilers, represented by the Barrow, Root, and others, is a considerable departure from old forms. The Root boiler occupies one-third of the space required for a cylindrical boiler. In it are combined safety, economy, simplicity in construction, facility in taking to pieces, and transport over hilly countries. One firm in Middlesbrough has 19 of Root's boilers, equal to 1950-horse power; another corporation has 14 boilers, equal to 830-horse power; and a great number more are in use in England and abroad. So far as the writer knows no fatal explosion has happened with these boilers; the limited water and steam space, the thinness of the tubes, and their small diameter combine to make them safe and economical. The Barrow sectional boiler has also been largely used; it differs in construction a little from the foregoing boiler. Every tube is tested to 300 lbs. per square inch, and made perfectly tight before leaving the works. Where it is possible to obtain pure water for boilers the writer believes that both these sectional boilers give the results assigned to them; but where the water is bad, as too frequently is a fact, there is considerable trouble occasioned by furring in the tubes.

The sectional boiler of Messrs. Hawksley, Wild, and Co., of Sheffield, is designed to work at 120 lbs. pressure per square inch, or more. Each boiler consists of one, two, or three sections, and each section consists of three horizontal tubes or cylinders; the upper tube being 3 ft. in diameter, contains water and steam, the two lower tubes, 2 ft. 4 in. in diameter, contain water only, and are enveloped in the flame or heated gases from the fire. The gases circulate thrice the length of the lower tubes. In the larger sized sections the upper horizontal tube is 30 ft. in length, the lower tubes 21 ft., and one section will make a 50-horse boiler. Sections of less length than this are made, which would generate steam equal to 35-horse power in each section. Another sectional boiler, made by the same firm, is designed to be fired by gas. It is made in two instead of three horizontal cylinders, and communication is made between the two by four short vertical tubes, 17 in. in diameter. The lower cylinder is filled always with water enclosed in a brick chamber, through which the ignited gas passes to the chimney, completely enveloping the cylinder. The upper cylinder contains water and steam, the heated gases impinging on the lower half. The boiler is suspended by bolts from two cross girders resting on the brickwork, thus allowing free expansion and contraction of the cylinders. These boilers combine safety with the use of very high pressure steam, reduced water space, and strength, owing to the small diameter of the cylinders as compared with Cornish boilers. They are also accessible for examination, cleaning and repairs, both internally and externally.

The vertical boiler may be briefly adverted to, though it demands a lengthened notice, owing to the variety of forms and the extensive uses to which it is now applied. The chief advantages are the small space they occupy and their portability. Their utility has been greatly augmented of late years by the addition of small tubes above the fire. These are either flue tubes or water tubes, and the superiority of the one to the other is a disputed question with engineers. It is certain that some of the modern vertical boilers can be made to take up a large part of the heat created by the combustion of the

fuel. The vertical boiler of Cochran and Co., Birkenhead, has 63 horizontal flue tubes, placed above the fire-box, and can be made equal to 60-horse power; it is really a short multitubular boiler. The common form of vertical boiler has two or more cross water tubes placed in the uptake. There are others made with vertical flue tubes, which do not seem so well adapted for giving out heat to the water as horizontal tubes are. The vertical boiler made by J. Blake, of Manchester, has short vertical water tubes above the fire-box (about 20), and the heat and flame cross through them horizontally to the chimney, which is favourable to the abstraction of heat and the obtaining of economical results.

M. E.

## NITRO-NAPHTHALINE BLASTING POWDER.

SIR.—So much has of late been written concerning the relative advantages of gunpowder and dynamite for mining purposes that I think most persons must have come to the conclusion that each has much to recommend it, although each may have some drawbacks. Under these circumstances I should think that a blasting compound, which will really stand midway between the two, will be superior to both. It is well known that the only purpose of graining and glazing ordinary gunpowder is to prevent the separation of its component parts, to prevent the absorption of moisture, and to ensure a more rapid combustion, and Mr. Charles Felhoen, of New York, has devised a method of accomplishing these results without resorting to those expensive and dangerous processes. For the manufacture of the new explosive Mr. Felhoen employs 75 parts of saltpetre, 12½ parts of sulphur, and 12½ parts of charcoal, which are to be separately reduced to an impalpably fine powder, and then intimately mixed. To 90 parts of the above mixture he adds and thoroughly mixes 10 parts of nitro-naphthaline, prepared as described; no special precaution or mode of mixing is needed in effecting the several mixtures.

Nitro-naphthaline belongs to a class of explosive substances (nitrated hydro-carbons), such as nitrate of ethyl and nitro manthane, some of which are fluid and others solid, and which have not generally come into much practical use; several of these bodies would answer the purpose, but preference is naturally given to nitro-naphthaline, as it is cheap and plentiful. Mr. Felhoen prepares his nitro-naphthaline by digesting with or without heat one part of naphthaline in four parts of nitric acid of specific gravity 1.40 for five days. The naphthaline is converted into a brown unctuous crystalline mass, which must be well washed with water to free it from all traces of acid, then dried and pulverised. By this means he obtains a mono-nitro-naphthaline, containing a small proportion of di-nitro-naphthaline. He does not confine himself to the exact proportions either of the gunpowder or the nitro-naphthaline, but finds the proportions mentioned answer the purpose very well. The advantages of the new explosive are that it does not explode from friction or concussion; it does not require a fulminate of mercury, gun-cotton, or nitroglycerine to explode it, and though these agents may be used it may also be exploded by the use of the common fuse; it burns more slowly than common gunpowder, but with much greater violence; ignited in the open air it burns, but does not explode. He finds from numerous experiments that no less than 10 per cent. of the nitro-naphthaline should be used; the quantity may be increased *ad libitum* to perform the offices required. If these advantages can be established in practice the nitro-naphthaline powder certainly ought to come largely into use.—*New York, Dec 29.*

MINER.

## GOUDRONITE—NEW TAR BLASTING POWDER.

SIR.—At one of the meetings of the English Iron and Steel Institute I think it was Mr. Menelaus who was reported to have said that he thought they had tried in South Wales nearly all the extraordinary proposals that had been made in connection with the metallurgy of iron and steel; and this assertion was followed by the enquiry of an impetuous inventor whether they had tried his process, in answer to which Mr. Menelaus rather cruelly said—"Well, no. I don't think we have gone so far as that." Now, in the matter of blasting powder for miners, many of the most remarkable propositions have been made and been tried too; but I believe tar blasting powder is a novelty which has still to be tested. In order to produce a blasting powder which, while having great dynamical power capable of graduation for mining purposes, shall possess the quality of being non-explosive in the open air, or by percussion or friction, Mr. Herrenstein Courteille, of this city, a chemist of some considerable reputation, has invented such an explosive, and as the whole process of manufacture can be completed in from one to two hours, it ought to be brought into the market very cheaply.

The ingredients used are nitrate of soda or saltpetre, sulphur, and charcoal, which form the chief elements or base, and with these he combines peat, metallic sulphates, as well as coal of a hard nature, and the oils or fats of animals, or tar of any kind, which produces the equivalent results to the oleaginous matter. These ingredients comprise the compound, and are put under process in bulk. While the proportions of these ingredients may be slightly varied, yet experiment has shown that the following have proved the best for the purpose, varying from the minimum to the maximum, according to the strength desired. For manufacturing 100 lbs. the proportions will be—nitrate of soda or saltpetre, 60 to 75 lbs.; sulphur, 10 to 12 lbs.; charcoal, 7 to 10 lbs.; peat and hard coal, 9 to 12 lbs.; combined metallic sulphates, 2 to 4 lbs.; and oleaginous matter, animal or vegetable, refined or crude, 1 to 3 lbs. Tar in any form will answer the purpose of such oily matter.

All the solid matters are pulverised and mixed together with the metallic sulphates. These are all subjected to the action of steam in an open vessel until thoroughly saturated, when the direct application ceases. With this he combines the action of external heat by superheated steam, the vessel being provided with a double bottom for that purpose. The effect of this combined heating action is to bring the mixture to a uniform solution and perfect incorporation of the materials, and effect an entire vaporisation of the liquid by prolonging the external heat until the compound becomes dry, which occupies a period of about 30 minutes. During the vaporisation of the liquid the temperature of the heating element in the double bottomed vessel is being slowly reduced from 250° to 150° Fahr.; this reduction is made to ensure perfect safety in the drying process. When nearly dry he takes the mass out and puts it on a drying platform of metal heated by steam or hot air, and under this action in about 15 minutes the powder is ready for packing.

The employment of peat, charcoal, and hard coal makes the powder but slightly inflammable or of slow combustion, and the combination with these of the metallic sulphates and the oily matters makes the powder non-explosive in the open air and by friction and concussion, and at the same time increases the strength when it is confined in the chamber of a mine. Were it not for the external application of heat simultaneously with the direct application of steam, the process would be prolonged and slow, and the incorporation of the ingredients would not be so perfect. The chemical reaction which occurs when the compound has been in ebullition for a period of 15 minutes consists in swelling or a development in bulk to an increase of about one-third of its volume; and this action would be ineffective, and the product in consequence less efficient, were it not for the application of internal and external heat. The superheated steam avoids the use of fire and all danger arising therefrom, and hastens the process. In practice he has found that the combination of charcoal with peat and hard coal produces the best result in rendering the combustion less instantaneous (for blasting powder a matter of great importance), and the combination of these with the sulphates of metal gives the best effect in rendering the compound in explosive in the open air by concussion and friction; and I am not aware that these materials have been combined in any known process for the manufacture of powder, nor that oils or fats have been employed in their natural condition with them. In my process these materials are treated at once, and the process is completed in one operation, as stated, and not carried on under separate operations.

I do not think any question will be raised as to the desirability of giving such an invention as this a fair trial since it seems calculated to secure all the advantages of the nitroglycerine compounds without their dangers—indeed, the essential feature of the invention is the dispensing with the use of glycerine, and yet obtaining a strong

powder by the combine action of the peat and hard coal with charcoal, metallic sulphates, and oils, making a new compound by a very cheap and quick process for preparing the powder. But this is not all, for in the manufacture of goudronite by Mr. Courteille's process all danger of explosion is avoided, human life relieved from constant jeopardy, rates of carriage diminished, and, indeed, the innumerable advantages of absolute safety secured.

G. H. C.

New York City.

## MINING IN IRELAND—No. IV.

## CONVERSATION BETWEEN A FATHER AND SON.

FATHER.—It was my intention to conclude my remarks on the coal formation of Ireland this evening. However, I find to do the subject justice I will have to make it at least in part the matter of yet another conversation.

SON.—By the way, father, I should like to know the composition of the coal obtainable in the different districts you have already described.

FATHER.—I shall enter thoroughly into that next time, but this evening a description of the Connaught coal field—in the words of Dr. Kane—will occupy all our time.

SON.—Yet another word, father, before you commence. Would it not be public money turned to good account if the Government would work some of the Irish mines, so as to give employment to the starving population of the South and West?

FATHER.—The Government are already lending money to Irish landlords with a view to find employment for the poor. Mining, however, may be carried on by the Government at a profit in many places, besides which it would be a great means of relief in the distressed districts. Government mines were at one time opened in the County Wicklow, in Ireland, for the purpose of obtaining gold, but on that occasion no profits were made, though some gold was found, and considerable explorations then made. In Austria, Spain, and other continental countries government mines are being worked to a great extent; and it would not be without a precedent if our Government were to engage in the working of mines.

SON.—I am glad you agree with me in this view, father, as it merely occurred to me in connection with the Irish distress; but, even apart from that, I see it is not unusual for a government to engage in mining operations.

FATHER.—The hills which surround Lough Allen form the Connaught coal field; they occupy large parts of the counties of Roscommon, Sligo, Leitrim, and a portion of Cavan, in Ulster. The greatest length of the district is 16 miles, which is also its greatest breadth; the total area is about 114,000 Irish acres. Seen from the south they present a steep and straight ridge of from 1000 to 1200 ft. in height, the summit flat, and usually covered with bog. The centre of this district is occupied by Lough Allen. The circuit of the lake may be conveniently divided into four parts with respects to its content in coal. The rocks are similar to those of the other coal fields; they consist of sandstone, sandstone slate, slate clay, clay ironstone, and fine fire clay. The strata are very regularly arranged, conformably to the limestone on which they rest, and contrary to the declivity of the hill. Slips occur, as in all coal fields; they do not present anything peculiar here. West of Lough Allen the River Arigna divides the field into the southern and western portions. The former consists of one great mountain ridge, named Brehieve; at its base are the Arigna Ironworks. The western division extends between the Arigna and Dorobally rivers. These two portions have almost the same internal structure. Upon the limestone rests slate clay in thickness from 300 to 600 ft.; this rock is remarkable for the rich beds of ironstone which it contains. These are exposed in the channel of the River Arigna in incredible numbers. Higher up occur numerous beds of sandstone, and next the fire clay, which, as in the Leitrim district, forms the seat of the coal. The beds of coal found in this district are three in number, and were first described with detail in Mr. Griffith's report on the Connaught coal formation. As the extent and character of these beds of coal will be found of high importance, and that opinions differ regarding them, I shall transcribe in full the most important of Mr. Griffith's observations. Of the first bed of coal: The fire-clay is succeeded by a bed of coal, which varies in thickness from 1 to 3 ft.; it is known in the country by the name of the Crow coal; it contains numerous thin laminae of black slate clay, which renders it of little value except for burning lime. When first brought to surface it is moderately solid, but on exposure to the air it soon divides into thin flakes. This bed has never been wrought; if it were I have little doubt its average thickness would be found to amount to 3 ft., but it has never been seen excepting at the outgoings. In the vale of the Arigna, near the ironworks, where the fire clay was wrought, this coal was 3 ft. thick; this coal runs parallel to the Three-foot coal, which lies above it, and its outgoings may be traced along the face of the hills through the greater part of the southern and western division of the district.—Of the Three-foot coal: The future prosperity of the Connaught coal district may be said to depend entirely on the produce of this bed, which, though of moderate thickness, is fortunately of great extent; its quality as fuel for domestic purposes is excellent, and if used for smelting iron is among the best in the Empire. According to the analysis of Kirwan 100 grains are composed of 71.42 carbon, 23.37 mixture of asphalt and maltha, 5.21 grey ashes; specific gravity, 1.351. The thickness of this coal is rarely less than 3 ft., or more than 3 ft. 4 in. In its outgoings, commencing at the ironworks, it may be traced without difficulty along the northern face of Brehieve Mountain without any material interruption for 4½ miles by Aughabey Colliery nearly to Geeva Point, in the county of Sligo, and from thence back on the opposite side of the hill to Tullylions Colliery, and afterwards the round the eastern end of the mountain to the point above the Arigna Works. In the western division of the district the extent of coal is not so great as in the southern. This division may contain about 1200 acres of the Three-foot coal, which, added to 2800 acres contained in the southern division, makes a general total of about 4000 acres. From this calculation we should deduct one-fifth part to allow for impurities in the coal, and the loss occasioned by slips and undulations; this, at the rate of 7840 tons per acre, will leave upwards of 30,000,000 tons of coal as the probable quantity which may be raised out of the southern and western divisions of the district. The third bed of coal varies from 8 to 9 in. in thickness; it is the uppermost bed of coal in the district, and has not been met with except in the southern division. On the Three-foot coal several collieries are worked; of these the Rover and the Aughabey are the principal; the former are situated very near the ironworks; the latter further distant. Coal from the Celtnavand and the Meenashama pits will also be found, amongst those of which the composition will be given further on. These coal beds being at a higher level than the general surface of the country admit of being worked under the most favourable circumstances, the expense of raising the coal is very small. Mr. Griffith calculated that the cost of it at the pit's mouth was 4s. per ton, and when the ironworks were in operation it was contracted for at 5s. per ton. At the time that Mr. Griffith visited the locality and reported on it, the collieries were in such a wretched condition, flooded with water, their machinery out of repair, and the persons engaged about them so ignorant that complete accuracy in the information he obtained could not be expected, and it would appear that the results above given require some alteration. I shall, therefore, in order to indicate as fully as possible the special circumstances of the district, detail, though briefly, the results of examinations of certain portions of it made by mining engineers. None of them, however, it must be remarked, enquired into the general structure of the locality as Mr. Griffith did, nor were any of them in that position which would justify equal authority being attributed to their individual reports. After the first exposure of its extraordinary proceedings, when it became indispensable to pay some attention to its proper business, the Arigna Iron Company commissioned Mr. Twigg, of Chesterfield, a person practically conversant with collieries and ironworks, to examine their holdings in this district, and he made several reports on the subject, of which a very excellent digest has appeared in the *Survey of Roscommon*, published by Mr. Weld. From Mr. Twigg's reports it would appear that the bed of coal, as it sinks into the mountain, rather diminishes in thickness. He found it in the Chisel pit at Aughabey 2 ft. 7 in. thick. Mr. Weld found it in a pit which he examined to be less than 2 ft.

SON.—Are there not slate, slab, and stone quarries in Ireland, father, as I have heard the houses of the poor are very bad ones?



**FATHER.**—The country teems with materials of every description required for building purposes or erections of any kind, yet it is said to the disgrace of the landed proprietors of Ireland there is not a worse housed peasantry in the known world. However, as mining forms the topic, we will depart from it as little as possible, and later on you will receive considerable information as regards the capabilities of the country in all that concerns us as miners.

**SON.**—It was only yesterday I saw some beautiful variegated marble, which they told me comes from Ireland.

**FATHER.**—True, John, Ireland is rich in marble. Near Armagh is found a marble which, from the excellence of its surface, and the variety of red, yellow, and brown tints which it shows, possesses great beauty; it contains abundant fossil remains of fishes. A similar marble, elegantly variegated with yellow and purple, occurs at Churchtown, in Cork, which county is, indeed, rich in this material, there being found black marble at Churchtown and Donerail, purple and white and blue and white marbles also at Churchtown. Ash colour, grey, and dove-coloured marbles at Carrigaline and Castle Mary; pale brown marbles at Killea; in Kerry there are black and white varieties of marble; near Dunkerron marbles of various colours—black and white, purple, white and yellow, and some specimens of purple colour veined with dark green resembling bloodstone. At Carraigheath in Down, at Logus and Ballysimon in Limerick, at Westport in Mayo, and at Castlebegs in Tipperary, are quarries of black marble. Next time I will give you still further information on this head.

**SON.**—Thank you, father. What a wonderful variety of marbles! *New Cross, London, Jan. 20.*

#### THE LONDON COAL SUPPLY.

**SIR.**—My correspondence in last week's Journal on the cost of Silkstone coal delivered into consumers' premises at 15s. a ton, and of passenger and goods traffic reduced to under a moiety of existing railway rates by my gravitation system of transit, merits the serious consideration of the statesman, legislator, and public generally. The most eminent practical railway authority in the present generation, the late Nicholas Wood, coalowner, colliery viewer, and railroad proprietor, stated in his Practical Treatise on Railroads, "Public opinion was in an unsettled state as to the value of railways when the mania of 1825 brought every scheme—good, bad, and indifferent—before the public." The new President of the Institution of Civil Engineers stated last week in his address, "The laws which governed mechanical traction and forces were formerly very imperfectly understood." If it could be imagined a possibility for the spirits of those departed reputed eminent engineers, locomotive builders, ironmasters, contractors, and pioneers of the surface railway system to favour the world at this stage of their existence with their autobiography in its truthful entirety, we should undoubtedly elicit what is unknown to many—the cause of the surface and not the gravitation railway having been adopted. In the former thousands and thousands of pounds have been acquired, which so-called pickings could not be culled from the undulating system, requiring strictly neither locomotives, rails, nor contractors' cuttings, and embankments, &c.

**Mr. Edwin Chadwick**, an eminent authority on railways, stated to the Royal Commission on Railways: "The whole action of the railway directories as a class has been one of gigantic failure, promising 10 per cent. to original shareholders and only giving little more than 3 per cent." The Proceedings of the Society of Arts show the recklessness with which the directors of certain leading railways have engaged in subsidiary undertakings, and in the construction or purchase of branch lines, many of which have been attended with heavy losses. **Mr. McCulloch's** 1875 standard edition, p. 1164, states: "Some leading directors have turned out nothing but gigantic swindlers, and all railways have suffered more or less from the discredit and suspicion attached to railway boards." An eminent French Government Commissioner delegated to enquire into the working of English railways states: "100,000,000 sterling have been lost in competitive internecine war between railways in the United Kingdom." The General Manager of the Midland Railway Company, the most experienced in coal and general transport in the world, stated in his evidence before the Royal Commission on Railways, in answer to Query 526, "Railway companies are very guilty in their contests with each other of starting useless lines bringing no dividend." The late **Mr. Robert Stephenson**, in an address as President of the Institution of Civil Engineers, stated: "What we ask is knowledge." **Goethe** had at a previous period exclaimed "Licht mehr Licht." The evidence of the late **Mr. Seymour Clarke**, General Manager of the Great Northern Railway Company, before the Royal Commission on Railways, stated in reply to Question 12,723: "I cannot tell you what the profit is of carrying a full train of coals at 4d. per ton per mile. There are those who hold that it is carried at a loss. I have made no calculation. The rate is attributable to the sea competition." His successor I heard give the following similar evidence in the Committee-room of the House of Commons, that "he could not tell the cost to the company of the transport of coal." The Chairman of this company, a well known companion of the Queen's eldest son, I shall be glad to learn has been elected on account of his knowledge and business habits.

The Railway Service Gazette, the property of an eminent and wealthy railway proprietor, states on April 5, 1878: "A gentleman of long experience in the management of railways thinks there are portentous indications of great calamities for the railway interest, calamities which will be due primarily to the practical irresponsibility of those entrusted with the direction of affairs." The Edinburgh Review, April, 1876, states: "It lies with the railway authorities to disprove the inference of a loss on their coal traffic, if possible, by the publication of details; in the absence of which no railway proprietor can tell what is being done with his property." The Proceedings of the Institution of Mechanical Engineers, April, 1878, page 191, state: "The positive loss incurred by the transport of coal is a sum which it is almost frightful to contemplate." The Times Money Market of March 21, 1878, has a letter from the able and experienced author of the "Index to our Railway System," in which he states: "It can be proved to demonstration that all the coal carrying trunk lines are in greater or less degree on the road to ruin." I have much more to adduce, but dare not encroach further upon your valuable space.

*Little Tower-street, Jan. 21.*

#### MINING IN NEW SOUTH WALES.

**SIR.**—The few following extracts may possibly interest your readers. **Boorook** is our (presumed) "Comstock," the lodes being a blende of silver and gold. Mining operations are being steadily carried on at Boorook. On Monday a parcel of 640 ozs. of retorted silver was forwarded to Stanthorpe by Messrs. Horton and Co.; while on the previous Thursday two bars of smelted silver, one weighing 50 lbs. and the other 5 lbs., were taken to Stanthorpe by Mr. Thos. Funnell. This is the first experiment we believe, in smelting silver that has been tried at Boorook, but we understand arrangements are being made there for the erection of a suitable furnace, and it is intended by Messrs. Horton and Co. to carry on smelting operations in connection with their plant. We learn that Messrs. Moffat and Co.'s machine, at Sawpit Gully, started for good on Wednesday last, the previous workings having been merely experimental trials. The machinery, we are told, works capitally, and will be a great acquisition to the place. They have got about 80 tons of stone down to the battery, of which 60 tons are from the Golden Crown Reef, and the remainder from other claims. The result of the stone from the former is looked forward to with some anxiety, but if it turns out at all near what is anticipated it will be a grand property.

The two following items show how Queensland is looking up in gold mining. I know Mr. Stubbley well, and he deserves all his good fortune, as he went into mining as a business, with energy, determination, and capital, and also behaving to his men in such a liberal manly spirit that he had their hearty co-operation. Speaking of the Charters Towers reefs, the Northern Miner says:—"The Brian O'Lynn cleaned up for the last fortnight's crushing 1243 ozs. 7 dwts., being 5 ozs. 3 dwts. 14 grs. to the ton; the preceding crushing, 1094 ozs., being 4½ ozs. to the ton; the yield for the month was 2337 ozs. 7 dwts., or about 8000l. a month gross yield. After deducting for working expenses Mr. Stubbley, the principal shareholder, draws about 1000l.

a week. This is a princely income, and it is likely to increase. Mr. Stubbley has been singularly fortunate in his mining ventures here."

**Gimli** is turning out splendidly all through the field, and there is good opening for permanent employment both of labour and capital on three or four different lines of reef:—"No. 6 South Lady Mary have cleaned up 108 tons of stone for the extraordinary yield of 1317 ozs. of retorted gold; 330 tons of stone from the Phoenix Company's claim have produced 301 ozs. of smelted gold."

We have all heard of London streets being paved with gold; but here the house was built with it evidently!—"The old Commercial Hotel at Castlemaine has been put through the crushing battery and yielded at the rate of about 7 dwts. to the ton. This statement (says the Courier) may appear singular, but it is nevertheless true, as we shall show. Many of the early residents of Castlemaine will remember that the building was erected by old Mr. Aberdeen, of Guildford, and that the bricks used in its construction were made from the sludge and clay taken from the bed of Forest Creek, which necessarily contained fine gold which escaped from the primitive appliances used by the miners in those days. For many years a roaring business was done in the old house, and it was at one time occupied by Mr. Farrell, the present Parliamentary Librarian. Reverses came, however; the hotel was deserted and fell into ruins, until lately a speculative genius hit upon the happy idea of putting it through the mill, and after taking away all the woodwork about the premises he sent the bricks and mortar to the crushing battery, and the result was the yield above stated. We have heard frequently of Victorian streets being paved with gold, but the fact of houses being built with gold is rather difficult to beat."

*Sydney, N.S.W., November, 1879.*

R. D. ADAMS.

#### THE FLAGSTAFF SILVER MINING COMPANY OF UTAH (LIMITED).

**SIR.**—I do not think it would be fair to certain parties who have lately been using their utmost exertions to bring about a satisfactory conclusion of the affairs of this company, with a view to the material benefit of those who have suffered so seriously by it, to pass over the contents of Mr. E. Pearson's letter which appeared in your valuable Journal of last week without some comment. Would it be too charitable an act on his part to allow someone else to have some credit, be it ever so small, in the matter, that he must now claim to be the originator of (as he styles it) the "plan now proposed" for raising a fund to purchase the mining claims on the Flagstaff lode? It is true that he did propose a scheme some two years since, but it was not only not feasible, but at that time totally impossible to have been carried out; and he is entirely in error in asserting that the plan now proposed is his plan, its terms being altogether of a different character. The plan, which will ere long be submitted, will amply provide for all who are entitled to consideration, both share and debenture holders, and this Mr. Pearson's scheme did not do.

There are one or two remarks I wish to make on this point in opposition to his so-called "plan." At that time there were two important litigation suits pending in America, those of Tarbet and Erwin Davis, both of which were then under appeal, the former to Washington City, and the latter to the Supreme Court of Utah. The Tarbet case involved a question of title to that part of the Flagstaff lode which had originally been sold to the Flagstaff Company, and the Davis case was in respect to his alleged ore contracts which the original directors entered into with him, and upon which they borrowed considerable sums of money for the purpose of paying dividends during the years 1872-3.

It was absolutely necessary, before any plan for the formation of a new company could be acted upon, that the decision in both these appeal cases should be given, as in the Tarbet case it was necessary to know the position in which the company was placed as regards its title, and in the Davis case it was also necessary to have it decided whether he had any claim upon the company which could be substantiated, or could in any way interfere with the company's property—the company having appealed against his application for the appointment of a receiver in respect of his original claim—as, in the event of the Supreme Court of Utah deciding in his favour (which was the case in the Lower Court) he would have held and worked the mine until the whole of his alleged debt had been paid off, which, from the manner in which his agent had previously worked it, would not have reverted to the company (or rather to the judgment creditors in whose hands it has been for the last two years) during the lifetime of any of the present shareholders. As I have already informed you of the final result of these appeal cases, I need not again refer to it, but you will see how impossible it was for any plan having for its object the purchase of the property lately owned by the Flagstaff Company—with a view to the formation of a new company—being consummated (and Mr. Pearson was aware of these facts), as then not only could no clear title be given to the property, but in fact no title at all. So far as my recollection serves me, Mr. Pearson's plan was based upon the proviso that the two litigation suits were decided in favour of the company's representatives, which was clearly counting the chickens before they were hatched. He has not been misrepresented as having opposed the present subscription, because I am not aware of his having done. He could not oppose it without knowing its nature. The misrepresentation has been in his endeavour to claim credit for an act which properly belonged to another, and which he (except by rumour) is ignorant of.

As regards the liquidation of the present company, it is not absolutely necessary to wind it up at present; that step will be taken at the proper time. A reconstruction, as such, so far as I am aware, has never been advocated, but an entirely new company is, I believe, in strong favour with the body of shareholders. It need scarcely be pointed out that, in the face of a powerful syndicate for the purpose of securing and properly working the Flagstaff Mine (which everybody believes to be of a most valuable and enduring character), the shares of the present company would be regarded in a very different light to that in which they have been held for a considerable time past.

A. A. DE METZ.

#### RICHMOND MINING COMPANY.

**SIR.**—Can you, or any of your numerous readers, inform me how it is that even in this period of mine mania Richmond shares are only 12 to 12½, seeing that in August, 1875, they rose to 16½, and were to my knowledge freely bought at 15½? This, at a period when those who had a knowledge of the mine and its affairs well knew that the then developed ore bodies were nearly worked out, and what ore there was hardly yielded \$5 to the ton; so much so that 14 months elapsed between the ninth and tenth dividend, which even then was only 7s. 6d.; and when, too, the indebtedness to the bullion agent was, as shown in the accounts, as much as 120,000l. Surely if, when matters looked so gloomy, investors and speculators considered the shares worth 15½ to 16½, they are worth this, and even more, now that the mine has shown what it can do, having not only successfully braved the crushing defeat which it sustained in its lawsuit with the Eureka, the enormous expenses of which it not only paid, but having given in dividends in 1878 2½ 15s., or more than half the price of the share; and in 1879 1½ 5s., besides being now stronger than it ever has been, both as regards its finances and the reserves of ore in sight. As to the finances, the Chairman stated at the meeting last month that the profits had for the first six months been 70,000l., and that there was every prospect of there being 120,000l. on the 12 months' working. As to the reserves, the directors and shareholders have for some weeks been looking forward to a connection being made between the ore chambers in the 400 and 600 fm. levels. That happy result has been effected, and as the ore has even been traced many feet above and below these levels, it is an ascertained fact that a column or pipe of ore has been laid bare having in its incline a length of 380 ft., and at two points where it has been cross-cut a width of 45 and 80 ft.; the ore, too, being of rich quality. Thus, then, a huge bonanza has been discovered, from which good dividends may safely be expected for a long time to come—equalling, if not exceeding, those of 1878.

As to the pending appeal against the decision given against the Richmond in the late suit with the Eureka, that is a mere bugbear which detractors of the mine like to hold up in *terrorem*. What does it amount to? Why, that if it does happen to be given against the

Richmond the judgment will hold good, and we shall have to pay the costs of the appeal. Be it known, at the same time, that as we are the appellants, we can drop the appeal if so inclined.

As to the dispute regarding the ore extracted from the Potts Chamber, should the worst come to the worst the Richmond Company may expect to be mulcted to the tune of 10,000l., not more.

Such are the present prospects of Richmonds. Surely these are better than many of the English and foreign mines which have never given a dividend, and some of which have not even started a shaft, and the shares of which are this day double and treble—yes, ten and twenty times—the value of the sums which have been paid on them, and many of which are liable at any time to a call being made on them.

*London, Jan. 22.*

AN INQUIRER AND SHAREHOLDER.

#### COPIAPO MINING COMPANY.

**SIR.**—I was pleased to see in last week's Journal a letter from "Shareholder," drawing attention to the merits of the Copiapo Company, as it has been a matter of surprise to me and others that so much has been written about the excellent position of the Panulcillo Company, and so little as to the prospects of the Copiapo Company. Your correspondent's estimates of profits at the Copiapo Mines appear moderate enough, considering the continued rise in the value of copper, and I hope they will eventually be more than realised. "Shareholder" speaks of 24,000l. per annum profit, in which event we may, I think, look forward to seeing the shares at something like the old price of 24½ per share, at which I have been told they stood many years since when the company's mining property was giving handsome returns. This figure of 24½ per share may seem somewhat high, but it must be recollected that there are but some 9600 shares in all issued (with 17½ paid), and 10½ per share on this represents but 96,000l. for the whole concern, including the freehold estates, a valuation which bears favourable comparison with the Panulcillo, which does not I believe possess much, if any, landed property, now selling in the market at over 350,000l. *Appropos* of the Copiapo Company's estates, I recollect hearing that our property embraced the whole of the fertile valley of Copiapo for a distance of upwards of 13 miles, and the other estate, situated near the coast, is I understand of considerable size. In conclusion, I congratulate all interested in the concern on the splendid prospects afforded by the richness of the Dulcinea Mine alone, the lode in which is reported to be worth ore of 40 per cent. in the deeper part of the mine, and some of the slopes to be capable of yielding 8 tons per fathom. Now that the revival in trade has brought about a daily increasing demand for copper, is it not probable we shall see higher prices still, in which case our shares should go much higher.

—ANOTHER SHAREHOLDER.

#### CAPE COPPER COMPANY.

**SIR.**—Just rising from the perusal of the Journal for last week it is quite refreshing to observe how cheerful the tone of your columns is. Should there now be reversal of what appears to be so decided a set in of the tide of prosperity, if 1880 be not the most prosperous of years to mining, then certainly the best of prospects and human foresight go for nothing. Those who say most and profess to know most about mining as an investment are untiring in their commendations of Cornish tin mining, and of certain copper and lead mines. How comes it, then, that there is such a marked reticence with respect to that prince of mines, the Cape Copper, which if I do not err has throughout the depression divided more profits among the shareholders than all the mines of Cornwall and Devon put together. This silence is particularly remarkable just now, when by splendid discoveries at the bottom the slight fear which a little while ago may have been felt as to the continuation downwards of that most magnificent deposit of copper has been completely dispelled. Indeed, the great fact of this discovery and the improved prospect of the copper market seem to be altogether overlooked, and to go for nothing. Further, there is the by no means unimportant fact that coincident with the henceforth assured continuance of richness of the mine at the bottom and the rise in the value of the metal, the new dressing-floors and the completed railway (both heavy items of expenditure borne during the last year or two) are now come into play as auxiliaries, by means of which large accumulations of the less rich ore will be marketed. Then, again, the new shaft now down to the deeper workings has intersected rich ore, and will at once come into play. This concurrence of favouring circumstance is in mining a rare one; it is only less remarkable than the silence of your correspondents about it. It is true a slight rise is registered in the shares, but it is a very bagatelle when compared with the immensely enhanced value of the property.

It is understood that there exists division in council as to the propriety of the intention of the company to become in future their own smelters. The idea is, indeed, an extraordinary one—so much so that it is very natural that it should cause a flutter among those concerned, and that it should create difference of opinion. All the public can say about it is that it is to be hoped that no step of the kind will be determined on without the most mature consideration and the fullest discussion, and then not until the vote of the body of shareholders shall have been taken; for the rest it can only be very grateful to the proprietary that after so long a series of years of the most brilliant and almost unexampled prosperity the company are able to entertain a scheme so ambitious.

Wishing you, Mr. Editor, "A Happy New Year" and prosperity to your excellent Journal, which year by year becomes more valuable and indispensable to the mining public, and rises more and more to the demand of the times.—*London, Jan. 18.*

OSWALD.

#### THE PANULCILLO COPPER COMPANY (LIMITED).

**SIR.**—I have read with interest and pleasure in last week's Journal a letter annexed the Panulcillo Copper Company, signed "Chili Bar," the more so as it virtually embodies the views which I have latterly, and not unfrequently, brought before your readers, and which find their best justification in the present prices of Panulcillo shares. I have repeatedly expressed my conviction, based upon facts and figures undisputed and undisputable, that these shares would soon reach again their old level—6½ to 7½. Well, this week they have been dealt in at 6½. One part of my prophecy at any rate is thus fulfilled, and that, it must be granted, gives some power of probability to my other prognostications—that Panulcillo will find buyers at 10½ each before the year is out. And why should they not? Who amongst the old body of shareholders, having patiently waited for years, would care to sell at present quotations, when they are just about to reap the due reward for their long enduring? No one when, with ruling copper prices, Panulcillo is making net profits at the rate of nearly 70,000l. per annum, equal to 35 per cent. on the par value of the capital. No one, when copper is likely to go much higher yet than present quotations and when we consider that each rise of 1½ in Chili bars represents an extra profit to the company of at least 1500l. per annum. No one, when we take into consideration that much additional profit may be now derived from the working of ground that had to be passed when copper was low. No one, when it appears from the monthly reports that the output is steadily increasing, 48,000 quintals metrico were raised in October, and 43,000 quintals in November, against the manager's prudent estimate of but 35,000 to 38,000 quintals. Speculators may dabble in the shares, buying and selling whimsically to secure a "margin," but genuine holders should stick to their holding and rather increase it, waiting upon prompt delivery of stock. They are sure to be rapidly and amply rewarded, for after reading the reports and studying the prospects, who can doubt but that Panulcillo shares are honestly worth 10½.—*Jan. 22.*

A PERMANENT SHAREHOLDER.

P.S.—"Chili Bar," in his useful enumeration of foreign copper companies, has omitted a very promising venture—the Copiapo Mining Company (Limited). This is also a Chilean undertaking of long standing, and ably managed. They have not sold any copper during the depression, but have opened up the mines in every direction instead, without incurring any debt, as there was still a rather large credit balance available for the purpose. Reserves of rich copper ore have accumulated to an enormous extent, and only now (with present copper prices) the regular output has been resumed. Regular



dividends must at once follow, as the company has no debts of any kind. Shares of 20s. each (17s. paid up) have rallied a little latterly, but are still exceedingly low—at about 10s. each. They are, however, sure to go much higher soon, and, therefore, are worth looking after at such an absurd discount.

#### PORT PHILLIP AND COLONIAL GOLD COMPANY.

SIR.—I shall be glad to be informed as to the cause of the great rise in the market price of these shares during the last few days. Being a shareholder, I naturally called at the office of the company to inquire the reason, but could only ascertain by the letters received by last mail the mine was looking worse, which information has been verified by no remittance being telegraphed this month. I understand that a dividend of 1s. 4d. per share will be recommended by the directors at the ensuing general meeting, as against 2s. last year. Now, considering the shares have stood for the last twelve months at 8s., in spite of the 2s. dividend, I am puzzled to know why they should rise nearly 100 per cent. on a 1s. 4d. dividend, with the prospects decidedly discouraging.

A SHAREHOLDER.

#### YORKE PENINSULA PREFERENCE SHARES.

SIR.—Your correspondent "Chili Bar" must be of a very sanguine temperament if he can derive any comfort as a holder of preference shares in the above company by a study of their last balance-sheet and statement of accounts. There are 54,000 15 per cent. preference shares, the accrued interest upon which amounts to over 40,000s., he says the whole of this interest will soon be paid. The shareholders will only be too pleased should he turn out a true prophet. The company has been years without paying a dividend, and I fear we must wait a considerable time longer before we can expect any return for the capital invested. This company is unduly loaded with preference capital.

#### IMPROVEMENT IN MINING—WEST KITTY MINE.

SIR.—I have before me two publications—the one is styled, "The Interests of British Capitalists and Investors—The Policy now to be Pursued," and is dated August, 1878. I read the following sentences:—"But when should a man invest his money? We say when scarcely any persons trouble to read the Money Article—when quotations are extremely low and stationary, and the feeling of distrust abroad causes stagnation. We say such periods are opportune for the investment of money. It requires, however, a great deal of moral courage to invest under such circumstances. If the reader doubts it let him try. Undoubtedly there are other conditions in which it is wise to buy stocks. It is well to do so on a rising market, or, rather, just as the market is beginning to rally; but how few there are who act at that time? But what about the present moment? Is this month a good time to invest? We answer, Yes, there never was a better in our recollection. Of course varied causes may result in the temporary disturbance of prices; but quotations will be at a considerably higher level than they are to-day, and that probably at a time not very far hence. We may on the subject of politics differ, yet if we look at matters from a disinterested and proper point of observation we must acknowledge that in spite of continental convulsions we are hastening on to great improvements. Commerce has suffered, but it will be all the better for the trial. Some, and indeed many, companies have failed in the general stagnation and collapse, but those which follow after will be all the stronger and safer for such failures. The lessons of the past are not lost on the individual or on the community, and the love of the Briton for activity and gain will reassert itself with a vigour which we shall do well to anticipate."

Under the head of "British Mines" the following significant paragraph also meets my eye:—"Here is a field for the intelligent and far-seeing investor. Let him consider the correct principles which should guide an investor, have at command accurate information, and, moreover, resolutely pursue his object, and we hesitate not to say that in the long run he cannot go wrong. Mining is undoubtedly one of the most interesting enterprises in which a person can be engaged, and in seeking to develop the mineral resources of our country we must inevitably be conferring the greatest boon on the working classes in the mining districts. Yet we should remember that there is risk involved, though we admit the real risk may not be so great as is the case in nearly all other investments, which are more popular and more in demand. All must further admit that in mining there is afforded a greater chance for a quick return than in any other description of investment; and if patience is called for, that patience will in the long run be amply rewarded. Whilst affirming so much we assume that the investor will exercise common sense before entering into the business. He has simply to be guided, and that absolutely by those on whom he can rely, because of their knowledge, standing, and the information they can command. In mining, as in everything else, the motto *Nisi desperandum* is the best. Most assuredly cases are not wanting of shares advancing 400 or 500 per cent. in market value in a week, of mines of wealth discovered as in a moment, riches come upon when least expected, communities made to flourish in mining districts, and all surroundings made glad, because of the determined perseverance of those who are resolved to do their duty by bringing to light the hidden treasures of the earth. We say that such incidents, and they are very many, prove that the investor in mines deserves, and is likely to have, a larger reward than any other class of capitalist if he resolutely embarks in his business in the light of such information as he can easily command."

I shall not be accused of egotism I hope when I admit that the foregoing paragraphs were written by myself, and circulated very extensively throughout England. To-day I read the following in a leading article in the Times newspaper, which I think may be taken as evidence as to the accuracy of my views with regard to the general situation of affairs in August, 1878:—"There seems little room for doubt that the revival in trade, long looked for in vain, has at last come. Signs of it are to be seen in every direction. The metal market has been advancing steadily, and prices have probably not reached the highest point at which they will stand. The charge for freights between this country and the United States has gone up, and the demand, nevertheless, continues to be in excess of the supply. Activity is the rule in every branch. The only complaint is that orders cannot be executed rapidly enough for the wants of merchants and manufacturers. The iron shipbuilding yards have as much work on hand as they can do, and though the prices of iron steam-vessels have advanced the orders which have been already received are large enough to ensure full employment to the working hands during the next six months."

But the one idea now to be conveyed to the mind of the public is that the revival in trade is real, and that we are not likely to have diminished demands for our various products for many years to come. It is reasonable, therefore, to suppose that we are now at the commencement of such a revival in trade as has scarcely been known before. The iron trade shows remarkable reaction, and, as is always the rule, tin as surely follows suit. Black tin will now realise nearly 60s. per ton; but it must not be forgotten that before the depression set in black tin was at 80s. per ton. What is there now to hinder tin going to the latter figure again? Great as has been the rise in our foremost mines I think it is too soon to look for a considerable fall in prices. The public must bear in mind when forming their conclusions the prices from which our leading mine shares dropped. West Kitty Mine dropped from a market value of 20,000s. to 2000s. on a drop of tin from 80s. per ton to 33s. and the depreciation of all other mining properties has been at least in that proportion, and in many instances, unfortunately, a final collapse has been the result. The advance in the price of shares has been just what might have been expected, seeing that black tin has risen from 33s. to 60s. per ton, and undoubtedly, with the present prospects in trade and the tin market in particular, it is a fair question for consideration whether Dolcoath is not now better worth 70s. per share with the present advance in the price of tin and the prospects of the tin trade than they were worth 25s. at the time of the Cornish lake failure.

West Kitty is undoubtedly better worth 20,000s. now than it was worth 2000s. in 1878; and this idea was clearly in the mind of one of the largest shareholders in Wheal Peewor when he said that West Kitty would turn out as profitable a mine as Wheal Peewor has done.

But assuming that to be correct, here is an anomaly. Wheal Peewor shares are at 34s., and West Kitty shares at 2s. each. If the authority of one who was certainly amongst the first authorities in Cornwall was correct, West Kitty ought to be now 16s. per share instead of 2s. Now, I shall in a future letter point out, if I can, other such anomalies. I take this one first because the facts are admitted, and everybody knows whose opinion is to be relied upon that West Kitty shares will go much higher—some say to 5s., some to 10s., and the more sanguine, "Why not to 16s. or 20s.?" comparing, as they have a perfect right to do, the market price of West Kitty with other properties similarly situated. There has been no branch of industry which has been so severely tried in the depression as mining, and most surely there will be none to feel the beneficial reaction so much, which has happily set in.

JOHN B. REYNOLDS.

37, Walbrook, E.C., Jan. 21.

#### WEST KITTY, AND WHEAL KITTY.

SIR.—They say "comparisons are odious," and so in many cases they are, but in mining matters just now we are obliged to draw comparisons to get at facts. Can anyone explain to me why West Kitty shares are at 2s. each, and Wheal Kitty at 5s. 6d.? They are very close neighbours—indeed, adjoining mines—and Wheal Kitty has already given 50,000s. profits, and may give 50,000s. more for anything I know to the contrary; therefore, I have not one word to say against Wheal Kitty, nor against the buyers of the shares. But what about West Kitty? I never see them favoured with a quotation in the daily papers, and nowhere indeed but in your ordinary list and the local Cornish papers. Your City Article does not even mention them. I am a shareholder, and intend from the very silence to increase my interest. But why the silence? and why are the shares only at 2s. each? The value of an article truly is what it will fetch. But why do not these shares fetch more? That is my question. The answer I take to be because they are not widely quoted. I suggest that the sooner they are widely quoted the better. I see no reason for hiding the fact of West Kitty shares being in demand in Cornwall at about 2s. each, and being quietly picked up in every direction. If the public are to be benefited I maintain that too much publicity cannot be given to the merits of the mine itself. What are the facts? One fact is, that in driving towards Wheal Kitty in the 72nd east they have a lode improving in value and appearance every foot they drive, and the distance between this end and Wheal Kitty boundary is 90 fathoms, and it is a reasonable expectation that there is just that length of tin ground before them unexplored—a mass of mineral. Another fact is, that the West Kitty Company have just secured a most important addition to their sett; a little strip of ground truly, but containing it is well known hundreds of tons of tin. Other things might be noted on paper. They do not escape the attention of those who are buying the shares; but it is time that the public should be considered in mining matters, and thus the liberty I take in making these no doubt very insignificant facts public.

Walbrook, London, Jan. 21.

JUSTICE.

#### WHEAL NEWTON—PRINCE OF WALES.

SIR.—In the current number of the *Mining Journal*, page 64, it is remarked that the Well lode has been wonderfully productive in Wheal Newton; and this is correct, as between February, 1877, and July, 1878, fully 10,000s. worth of silver ore was raised from it. It is, however, further remarked that as it runs through the Prince of Wales sett it adds to the value of the latter property. I beg to inform you that the Well lode is not contained in Prince of Wales sett, which lies to the north of Wheal Newton, and as the Well lode runs through the entire length of Newton sett from east to west, and underlies south, it cannot possibly get into Prince of Wales sett. The Wheal Brothers silver lode is to a certain depth contained in some portions of the Prince of Wales sett, and has been very productive for silver, but only comparatively shallow workings have been prosecuted on it. As this lode also underlies south it passes into Newton sett in depth. The Newton Company are now engaged in driving a cross-cut north from the Well lode at a depth of 40 fms. below adit in order to intersect the Wheal Brothers silver lode, which they hope to reach very shortly.

Callington, Jan. 17.

H. BENNETT.

#### BLUE HILLS MINE.

SIR.—The attention of investors is now being directed to the shares of those tin and copper mines which have not yet participated in the great and almost unprecedented rise that has taken place in all the leading mines of Cornwall, and low-priced shares which are known to be sound have been eagerly sought after. Prominent among them is Blue Hills, the shares of which have been in great request during the past week. This interesting tin mine adjoins Wheal Kitty and Penhalls, in the celebrated St. Agnes district, and is traversed by the lodes of both these mines; the property, therefore, is a valuable one. The prospects of the mine are good, and have improved of late, and I am told regular profits are now being made. The number of the shares is under 4000, and it will be seen, therefore, that at the present market price (4s. per share) the mine is selling for a very small sum.—London, Jan. 22.

S. T.

#### CHEAP MINING SHARES—PANDORA.

SIR.—Can any of your correspondents inform me, through the medium of your valuable Journal, of the reason for the shares in the above mine being quoted at the present low price? The mine has been stated by competent judges to be a very valuable one. It is being worked on powerful and well defined lodes; is at the present time making regular profits, and will shortly, upon the completion of another level, yield handsome returns. It is, therefore, considering the advanced prices of lead and blende, difficult to understand the low market value of such a property.

London, Jan. 23.

A SHAREHOLDER.

#### ALL ABOUT TIN.

SIR.—After having provided the necessary appliances and proper quantity or supply of water for the dressing, you will still have to guard most jealously against the escape of tin, which will only be prevented by the closest attention. That necessary attention had better commence on the stone-breaking floor. This is still called the spalling-floor, because at some mines they still go on to break up the hard tinstone by small hammers wielded by men and women, although the writer has had Blake's stone-breaker at work, in the centre of the town of Redruth, for seven years or more. Whether the stuff be broken by machinery or by manual labour this is the sampling-floor, and from this place and your assay office you ought to calculate nearly how much black tin is contained in the tinstone daily sent to the stamps. Now this is done after a manner, but not always correctly done, and may in some instances be improved on. I do not intend to convey that anything like absolute correctness is possible, but that a closer approximation can be obtained than sometimes is obtained perhaps few will dispute.

Taking the tinstone by weight seems to be coming into favour, and may be regarded as likely to lead to more correct results than the old plan of measurement, and yet some points have been lost sight of in this weighing. One thing that has been lost sight of is that no allowance has been made for the slime tin passing over the shovel in the black tin assay. That the old men saw this is sufficiently clear from their having provided for a loss of one-eighth, or 12½ per cent., in this way in the rules they have given us for estimating the quantities of black tin made up by sack-work, wherein they add 12½ per cent. to the assayed result. While seeing this, however, they seem to have missed another and very important source of error, in this way. If we regard 100 12-gallon sacks of ordinary tinstone as weighing 10 tons, a quarter noggins as taken for assay should weigh 42½ dwts. troy, but, instead of this, it will weigh from 30 to 36 dwts. only when finely bruised. The sample is consequently erroneous to a much greater extent than that provided for in adding one-eighth for the slimes, for we have the tin only from 30 or 36 dwts. instead of from 42½ dwts., which is a percentage so large as will fully account for all the tin being returned as calculated, and yet pretty much getting into the river. In richer quality tinstone the quarter noggins will, of course, weigh more; but this in

creases rather than lessens the error, inasmuch as that 100 12-gallon sacks will weigh much more than 10 tons, probably nearer 15 tons.

From the above it will be seen that if we weigh all tinstone from the sampling floor at 20 cwt. to the ton, adding one-eighth to the tin produced in the sample, we ought to be getting tolerably near the true position for a correct estimate of the tin which ought to be returned from the dressing floor.

Redruth, Jan. 21.

W. TREGAY.

#### SOUTH WHEAL FRANCES.

SIR.—Pascoe's shaft is now 2 fms. below the 215 fm. level; the lode in this shaft is worth 40s. per fathom for 12 ft. in length. The 215 west is worth 12s. per fathom; the end is very wet, and the lode is much harder than when last reported. The rise in the back of this level is worth 15s. per fathom. The winze sinking under the 205, just over the above rise, is down 7 fms., the lode is producing a little tin, but not rich enough to value. In stopping this ground we hope to find a better lode further north. The 185 west is just as last reported, producing a little tin; the lode presents a kindly appearance, and we hope to be able to report more favourably of this level in course of another month. The stopes throughout the mine are looking fairly well, and we are selling about 10 tons of tin ore per week.—Redruth, Jan. 19.

A. T. JAMES.

#### THE MINES OF CARDIGANSHIRE.

SIR.—I do not think your correspondent, "Lynx," can know much of the tack-notes system, judging from the remarks in last week's Journal; indeed, his whole letter seems written more with a view to calling attention to Bwlch United Mines as an investment than anything else. Next week I shall be able to give you a short history of these mines and the past returns; but with regard to tack-notes, it is well known that all discoveries of mineral wealth in virgin ground are due to the indefatigable industry and labour of working miners, who—attracted perhaps by accident, or perhaps on chance—spend weeks and months searching for lodes at surface. Surely, therefore, if successful, which is not by any means very frequent, he is entitled to some bonus for his good fortune; at the same time, I quite agree with "Lynx" that the subsequent plunder before the public come in is disgraceful, and one of the greivels of mining in this county. Mines are bought (say) for 1000s., machinery and all, which almost immediately reappear in the London market with a capital of 20,000s., hardly a penny of this being reserved for working capital. If the landlords could devise some check for this it would do more for mining in this county than attempting to deprive the working miner of his little but hard earned gains.—Jan. 22.

Fox.

#### MINING IN LLANARMON.

SIR.—I am really very much obliged to Capt. Ede for his quiet banner. I must confess I am not a "mate" of his, but if I was I do not know that I should be any the worse for it. It is said that "a man is known by the company he keeps," and I feel sure that Capt. Ede's company or acquaintanceship could only tend to improve anyone who may have to come in contact with him, particularly in mining matters. I may say also that I have no interest in any company with which Capt. Ede has to do. I simply know him as a mining engineer of repute living in the district, described by one of the writers in the Journal as being most likely one of the foremost mining engineers "of the next decade." However, it is not unlikely that before long I may be a "mate" of his in a certain sense, and I can assure him I should not mention his name intentionally to do him any harm if I could not do him some good. My "interest" in the district, and if I can prevail upon gentlemen like Capt. William Francis (of Northop), Capt. Ede, and Mr. J. L. M. Fraser to show the outside public the advantages they would be likely to derive by making enquiries into the mineralogical and metalliferous wealth of this district they would do good in many ways. The march of events will compel them or others to do so. The question then is—who must do it? Must strangers, as it were, be allowed to come in to show the natives the way? If those who are on the spot and in the neighbourhood do not lead the way they will ultimately have to fall in the background. The mineral wealth is there, and it must be obtained either under the influence of one party or the other. I thank Capt. Ede for his good wishes for 1880, and reciprocate them fully with him.

In the discussion of my suggestion it is a most pleasing feature to me that I have already "struck a chord" which appears to me destined to vibrate until its sounds culminate in the completion of the object I have in view. It is gratifying to me that at once Capt. Ede can see the great advantages that would arise by the adoption and carrying out of my scheme even in a modified degree. He would strike out Lead Era and Bodidris for two reasons which he gives. So be it. I bow to his opinions, for he says they are out of the question. So it is no use discussing the matter as far as they are concerned. It is better that we should find common ground of argument than to discuss what we disagree upon at the outset, upon which we can work agreeably, honestly, faithfully, and in accord; and if by omitting the two properties named in the proposed scheme Capt. Ede intends that the "Westminster boundary" shall include the Nantadda, Lady Ann, Bryn-y-Mwyn, Pant-y-gulanod, Bryn Alyn, Old Westminster Mines, and any other smaller setts on their line, I quite go with him. The opinion expressed by him on my proposed scheme is really a very valuable one, and I think and feel quite sure he would not have given it if he had not had very substantial grounds for doing so. His opinion is thus expressed:—"To secure sufficient scope to establish a mine with the dimensions of Minera, possessing powerful champion lodes, parallels and cauners in similar proportion, affording facilities for development unsurpassed, it is unnecessary to overtop the Westminster boundary. In fact, the capital concentrated upon this would be more likely to turn out a financial success than if spread in developing the area suggested." Very good. I thank you, Capt. Ede, for that very candid, clearly expressed, valuable opinion upon my proposed scheme, and for respecting the spirit that prompted "Enquirer" to make the suggestion. All the gentlemen I have named in connection with this matter will most likely have seen the practical way in which I am prepared to embark in it in last Saturday's Journal, and unless we can be practical in these things we can be nothing; and now that lead mining is assuming its old position of activity and probable prosperity again no delay should take place in bringing this scheme of amalgamation into shape.

The area named is most valuable. Many features exist of a most exceptional character for good—proved veins, works in operation and talent in the neighbourhood to guide to successful results, good roads, proximity to the lead market, cheap labour, and an industrious and steady population brought up to mining pursuits. The question then is—"How can the several and separate interests and advantages of the district be brought together to be worked under one management with spirit and energy, to have the most effective and profitable work done out of the properties enumerated at the least cost, so as to be most remunerative to the future shareholders?" In the solution of that question I must say that I am very proud to see that Captain Ede says—"If I can be of any service in bringing this about I will be only too pleased." Capital! That is "something attempted" and something gained. I feel sure if the other three gentlemen I named on the 10th will come forward so handsomely and lend their influence and work to the scheme the battle is half won. It is pleasing indeed to me, now there is a bright prospect for this district that one so eminent in his profession appreciates my proposal, although he has only his suspicion as to my "identity." Never mind that; perhaps he will some day have a clearer knowledge of "Enquirer." At present I am content to remain unknown.

Well, then, to the gentlemen I have named "One and All," I would say, being practical mining engineers, try and devise some plan whereby you can get this scheme into shape, and bring the matter into a focus, by working out the details sufficiently well to put before your friends, so as to obtain the necessary assistance in every way requisite to carry it through successfully. I will, and in fact have done so already, and when the time comes for arranging details I shall be ready with all I can do. If I were a captain, an M.E., or a financial agent I would give as exhaustive an account of the properties named



in the Journal as you, Mr. Editor, would allow space for, believing that by so doing I should be aiding a public good; but, not being so engaged, I might expose my ignorance in the attempt. There are, however, gentlemen who can do so, and I hope they will put their shoulders to the wheel, and help forward the work. I shall be glad to see expressions of opinions on this matter by other friends in future numbers. The scheme is worth all the efforts that can be brought to bear upon it. For the present I have the pleasure to be—  
Jan. 19. ENQUIRER.

#### MINING IN THE LLANARMON DISTRICT.

SIR,—In continuing my observations on the mines in this locality I have to point chiefly to those of a comparatively modern existence, and of a growing promise of celebrity; but first I claim a passing remark on the steady progress and successful results of two of those formerly alluded to. The important discovery at the Bodidris Mine, made at a shallow depth, I am glad to find is improving in strength and productiveness in its deeper development, and will now yield over 3 tons of lead ore to the fathom. The bottom level coming under it, at about 40 yards deep from surface, is beginning to yield ore, and when fairly into the run the mine will assume a very important position, and as all the necessary machinery is now in course of erection for complete drainage to the rich bottom measures it needs little prophetic judgment to pronounce this property as one of the coming celebrities of the present age. They have I find from 40 to 50 tons of ore now dressed ready for sale.

I also wish to revert to operations at the Lady Ann Mine (the western portion of the old Westminster veins). The trial shaft on the new vein lately discovered has been sunk nearly 28 yards, with a continuation of ore ground for the entire depth. The vein has improved in appearance generally, and is now 4 ft. wide. It is calculated that the junction of the Westminster lode will soon be intersected with this new vein, and an important discovery of ore is confidently predicted at this point. It certainly appears to me that such a property as this, with abundantly proved veins running through it for more than 400 yards in length, should at once be vigorously handled, and I am pleased to find on enquiry that there is a project now being entertained of working this valuable sett in conjunction with others on a large and comprehensive scale by means chiefly of a drainage level from the River Alyn, 100 yards deep at this place.

The first mineral grant I will notice as being in a virgin state of development in this district is the Llandegla, which has recently been taken up by a deserving and spirited company from London. This mine is situated to the south of Bodidris, and adjoins it. It is a very spacious property, and there are already four (at least) main east and west lodes known to exist in it. It is the southern extremity of the mining district before taking an easterly bend towards the great Minera Mines, and it would strike even a casual observer as being as obviously capable of yielding ore as those of an older date. It is well spoken of by practical men of science, and it has the indisputable advantages of skilful and experienced management, being the same I am told as that of the adjoining Bodidris Mine, and is in a similar stratification of rocks. OBSERVER.

#### MINING IN LLANARMON.

SIR,—The correspondence in the Journal is causing attention to be paid to this district, both by financial agents and mining engineers, and investors in lead mining; and well it may. It is worth all the notice that can be given to it. I have seen some very important reports this week from very reliable sources of the value, both present and to come, of one property in particular, owned by a private firm named the Lady Ann Mining Sett. This property contains at least six proved main lodes, besides caunters. The owners are prosecuting their work very tenaciously upon one lode, and are now down upon it from the surface 27 yards, in a shaft 7 ft. by 4 ft. In sinking upon this lode the reports state that they have passed through and met with the most encouraging signs of a very rich deposit of lead in a few yards more depth. All the main lodes run principally east and west, and the lode upon which the men are now working is expected very shortly to come in conjunction at about 30 yards deep with the great Westminster lode, which in former years proved so immensely rich. The Westminster lode in the Lady Ann sett has never been worked, and is already discovered at surface. The Lady Ann property on its eastern boundary joins the Westminster Mines and the Bryn-y-Mwyn property. At all points, both east and west, this property is looked upon as the coming prize in 1880 in this neighbourhood. In fact, it is looked upon that almost any day a stroke of the pick or a blast or shot may make a great discovery, everything in the shaft now being worked upon being so congenial to that end. I am told also that this property is looked upon by many well able to judge as being the key to a great development of lead mining in this district. For the good of the neighbourhood and all concerned may it prosper, is the wish of—  
Jan. 22. RESURGO.

#### BETTWS-Y-COED AND LLANRWST DISTRICT.

SIR,—As a constant reader of your valuable Journal, and an investor in mining property in North Wales, I watched with much interest the successive letters of "Vide et Crede" on the mines in the above-named district; but he stopped short before he came to one of which I was most anxious to hear his report—the Griffin—the latest addition to the mines of the neighbourhood, and, although the youngest, yet from the official reports which we receive it should be one of the best. Having noticed in one of his letters the remark that "in other districts 90 fathoms deep from surface is considered merely as prospecting, and should be so considered in this district," I particularly wanted to hear his opinion of the prospects and working of this young mine, which in less than one year from allotment of shares had commenced ore sales, and with no level deeper than 15 fms. reports (in your Journal of this week) stopes now in hand worth 1 ton of lead ore per fathom, and dressing operations favourably progressing. If "Vide et Crede" is still in the neighbourhood, and still so disposed to so kindly assist those in the town and other places distant, will he turn his eagle eye to this property, and in another letter in your columns continue his series, and tell us, the shareholders, what he thinks as to the operations there going on.  
B. C. G.

NOVEL HYDRAULIC APPARATUS.—A simple and plain construction of apparatus, consisting of two cylinders with double pistons, which by the combination of their valves cause the ascending liquid column to remain always in equilibrium and compensated, so that the power applied is constantly equal to the quantity of liquid to be raised, and to any possible height, has been invented by Mr. DIEGUEZ Y ROMERA, of Madrid. The apparatus is composed of two equal cylinders, each divided by a diaphragm; the two upper and lower parts have their respective curbs, in order to adapt to the lower end a kind of sieve or sifter to prevent the pistons corresponding to these parts from being damaged, and for stuffing round the rods in order to avoid infiltrations, while leaving them liberty of motion. Each cylinder contains inside to pistons; the upper piston is hermetically adjusted with friction; the upper and lower pistons are united by a common rod to impart motion to them. In the middle part of each division of the cylinder formed by the diaphragm is opened a section on each side, the one to receive the liquid by means of a tube placed for that purpose with its valve, the other to drive also out by means of a tube the air compressed by the upper portion when put in motion. Each rod is provided with a connecting rod, which receives the movement transmitted by a lever of the first class, to the upper ends of which are adapted two connecting rods, receiving also the motion transmitted by two eccentrics fixed on the motive axis; at the centre of this axis is fixed a toothed wheel which engages with the pinion, at the end of which a fly-wheel is adapted; finally, at the opposite end of that axis is fixed a crank, by means of which the power is transmitted. The discharge tube is jointed, uniting the two cylinders in one tube. From this combination of the two cylinders with their respective double pistons it results that when the apparatus is put in motion the valves of the lower pistons float on the surface, and let the quantity of liquid to be raised pass, and depositing it on the flat surface of the upper pistons in passing through the outlet tubes in the above men-

tioned sections, so that the equilibrium of the liquid vein gravitates exclusively on the upper pistons, which in their ascension alternately fill the discharge tube.

#### REPORT FROM CORNWALL.

Jan. 22.—Mining matters have been in a very active condition during the past week, and there has been considerable excitement in the share market during the past few days, in consequence of the steadily rising character of the tin market, and the confident anticipation of further improvement. An advance in the standards is almost come to be considered as a part of the business of the week, and every time the anticipation is realised the appetite appears to grow by what it feeds on. There are not wanting indications now, however, that we may expect a slight lull. It is by no means certain that this will be; but the advance in the value of metals has been so rapid, and the improvement of trade, though certain and real, is of such a mere moderate character as yet, that it seems as if a balance must have to be struck ere long, and the one have to wait awhile for the other. However, we by no means wish to be understood as pointing in the direction of anything reactionary, only to impress the necessity which seems to exist for cautious action at this particular juncture. To be a little slow now is to be surer than to move too quickly.

The smelting question is steadily growing in force and practicality, though its latest development may not tend so much as is desirable to the consummation which is to be desired. The Penpoll Tin Smelting Works, of which Mr. E. Michell was the local manager, and which were built by Messrs. James and Shakspeare, have passed into new hands, Messrs. Strauss, the eminent metal brokers, and Capt. Teague being understood to be the leading spirit of the new proprietary. We do not anticipate that this will make much change in the present system. No doubt it will place the mines in which Capt. Teague is interested in a more independent position so far as sales are concerned, and it may introduce a little more competition, though the smelters generally understand each other too well for that. Of the existing five smelting companies two do more than half the present business—Messrs. Bolitho and Messrs. Williams—the others being Messrs. Daubuz, R. R. Michell, and the Redruth Smelting Company. It has recently been suggested that there should be a return to the old practice of selling tin ores by ticket. The wisdom of this, however, is rendered more than doubtful when we reflect for a moment on the manifold objections which we are accustomed to hear raised, and with justice, to the system of copper ore ticketing under which the copper mines are practically even more at the mercy of a combination of buyers than the tin mines are. To return to ticketing would be in our view a certain step backwards. So, too, we have little hope of the formation of a new smelting company in the co-operative mining interest. The only remedy we can see for a state of things which is an almost universally admitted evil is, as we have often said, for the mines to go back to the good old custom of being their own smelters. It would be impracticable, for reasons which will at once occur to any one who is connected with the treatment of copper ores, for copper mines to add that department to their operations, but there is no such difficulty as regards tin ore.

The ancient miners used merely to pile the tinstuff into heaps with wood, and obtain very fair if not altogether economical results, and there are still scattered up and down the country scores of Jews' houses, as they are commonly called, which shows how simply and yet how effectually the smelters of a somewhat later day used to carry on their work. In its present condition the question is one which presents no practical difficulties whatever—at any rate, those who have been challenged to show them have never been able to do so—and what it demands is full and fair discussion, not merely a grumble here and a ventilation at an account there. It is rather amusing to hear it gravely stated that the miner should not be unreasonable when he complains of the wide margin that the smelters have been carefully keeping of late—much wider than usual—because tin has gone up, and the smelters have been rapid in advancing the standards. If tin has gone up we take it the smelters have had very little to do with it, and judging by the extent of the margin, and the notable oscillations displayed on certain memorable occasions, it is not at all certain that the advance has been such as we have had a right to expect. It is the business of the smelters to buy cheap and sell dear, and no man of common sense would think of blaming them for it. Only it is equally the business of the miner to raise cheap and sell dear, and if the two things are not compatible why there must be a little friction.

Tin mining is likely to go ahead in East Cornwall. The article published last week in the *Mining Journal* on Phoenix United, showing the valuable nature of that property, and the immense wealth of its lodes, referred to the valuable mineral ground on the run of those lodes beyond the sett at Withy Brook. This is now about to be developed by an influential company, of whom Mr. R. Hawke, of Liskeard, is the principal promoter. Phoenix is doing so well, and has such prospects that the new venture has the very best promise.

Mine agents will do well to bear in mind that the time for sending in their returns to Dr. Foster, Her Majesty's Inspector, is fast approaching, as unpleasant consequences may follow. All returns have to be sent in on or before Feb. 1 next, and the obligation to attend to this is imperative. Last year there were no fewer than seven prosecutions and convictions in consequence of delays in sending in the returns, and we give this warning in time that the matter may not be allowed to be forgotten, and the important date passed by without this obligation being fulfilled.

#### REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Jan. 23.—House coal supplies are this week coming to hand more readily the result in part of the increased output at the collieries, and of the more complete arrangements which the carriers have made for transport. The return of the frost is viewed with some uneasiness by consumers of furnace and forge coal, particularly of the latter, for if it should be severe and prolonged the fires at certain of the works will run short of fuel, because of the closing of the waterways. Prices for forge coal are from 9s. 6d. to 10s., and furnace coal is 11s. Buyers would like to place longer forward contracts than owners will accept. Satisfaction was general on 'Change to-day in Birmingham at the news conveyed by circular that the sinking operations at the Hamstead Colliery lead to the conjecture that the New Red Sandstone has been passed through, and that what correlates with the "clunch" of the old South Staffordshire coal fields has, in the opinion of the sinkers, been reached. The shaft is now 534 yards deep, and it is believed that the total depth of the pit will be about 650 yards. If this should prove correct then it will be some 200 yards deeper than the shafts in the adjoining Sandwell Park Colliery.

The large demand for pig-iron is leading to the blowing-in of more furnaces. Four of the firms who are about to each blow in a furnace are Messrs. Groucutt and Sons, Messrs. Addenbrooke, Messrs. J. Bagnall and Co., and the Tame Iron Company. Consumers find it impossible to place contracts of much magnitude, as vendors are well sold forward. Prices for native sorts are firm, but unaltered. Derbyshire and Northampton pigs are selling wherever agents will book. Hematites are quoted at the prohibitive figure of 64. 10s. to 71. In respect to finished iron, it is to be reported that sheets are in heavy output, and for new orders 114. and 114. 10s. is the figure. The makers of bars are ready to accept more business if it were on offer, but they are strong at the price of 94. for branded sorts, and 84. to 87. 10s. for unbranded bars. The demand from the United States for hoops, bars, scrap iron of all sorts, old rails, and iron ore continues to be expressed in the Staffordshire market very conspicuously. Finished iron makers will not, however, place the orders on their books, as they necessitate long forward delivery.

Messrs. Tangye Brothers, of the Cornwall Works, Soho, have just finished one of two 20-horse power hauling engines for the Australian Agricultural Company, Newcastle, New South Wales. These engines are excellent specimens of engineering skill; and, whilst they sustain the reputation of the celebrated firm who produce them, they also serve to illustrate the growth and the progress of an important branch of Birmingham industry. Of their kind the engines are certainly unique. They will be used for hauling coal wagons

and tubs containing coal along an underground incline, 3000 yards long, and as they are adapted for mining purposes in Adelaide will render almost unnecessary the use of animal power in the pits.

Business in coal and iron in North Staffordshire continues good. An unsettled aspect has, however, been imparted to it this week by the action of the colliers. There are two miners' associations in the district, and the Amalgamated Union has decided to give notice next Saturday for a further advance of 12½ per cent. in wages, and the colliers in the Amalgamated Association have resolved upon getting a 10 per cent. advance.

A disastrous explosion of gas occurred on Wednesday morning in the Fair Lady Pit, belonging to the Crewe Coal and Iron Company (Limited), at Lycett, near Newcastle-under-Lyme. The explosion was in what was known as the Banbury 7-ft. seam, notoriously a fiery one, and that which has been the scene of most of the colliery disasters in North Staffordshire. The men engaged upon the day shift—about 72 in number—had just commenced work when the gas fired, and all, except perhaps 10, lost their lives. The explosion seems to have been one of the most violent on record. Amongst the killed are Mr. Greener, who was recently appointed manager of the mine, and his son. On Sept. 12 last an explosion, by which seven lives were lost, occurred at the same pit and in the same seam, and the doggy was charged on Monday before the magistrates with a breach of the Mines Regulation Act in connection with the accident. This man, who was upon remand, was amongst the workpeople in the pit at the time of the explosion.

#### REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Jan. 21.—A general rise in the price of coal to the extent of 1s. a ton is to take place from Feb. 1. The price of coal for shipment in large consignments has already advanced, and orders have been refused by some of the larger collieries at 6s. 6d. per ton at the pits. The severe frost we are having will also stimulate the demand for house coal, so that for some time at least there are reliable indications of activity. There has been an influx of water at the Broncoed, or Oak, Colliery, near Mold, which necessitates the removal of most of the plant from the old pits, and the cessation of work to a considerable extent; but new pits are being sunk under more favourable conditions at a little distance from the old, and it is anticipated that when complete the colliery will afford employment for 1000 men. I hope it may be so. There is increased activity at the limestone quarries. Mr. Lester's quarries at Minera, for example, yield a limestone not only adapted for fluxing and ordinary purposes, but also for use in chemical works, considerable quantities being sent to the chemical works of Lancashire. A contract has been entered into at these quarries which in itself exceeds the total production of stone last year. Additional workmen are being engaged, and new plant added. Another sign of improvement in trade lies in the increased traffic and receipts of the local railway companies. Both the Cambrian and the Brecon and Merthyr Companies show a decided increase as compared with the same week last year.

I am pleased with the appreciation by "Lynx" of my remarks at the close of the year. His description of the *modus operandi* too often pursued in Cardigan and elsewhere in obtaining mineral grants and floating mining companies are exceedingly pertinent and sensible. I must correct him, however, in one quotation from my report. I said that only 13 out of 37 mines in Cardigan paid a profit, not that this number were idle. I am glad that he falls in with my suggestion for the establishment of a "North Wales Institute of Mining Engineers." South Wales, the North of England, the Midlands, and indeed all the chief mining districts, have such institutions, and I say it is a reproach to north Wales not to have one. My friend Mr. D. C. Davies, of Oswestry, has already made a move to supply this want, and if "Lynx," or any other mining man in North Wales would communicate with Mr. Davies on the subject the movement might be helped to a successful issue. I would suggest the desirability of calling a series of meetings in Wrexham, Mold, Holywell, Llanwrst, Shrewsbury, Oswestry, Llandidloes, Aberystwyth, and Carnarvon, at which the constitution and aims of such a society might be discussed and its rules framed. There can be no doubt, I think, that if properly worked a vast amount of most valuable information relative to the mines and mineral structure of North Wales might be collected which now dies with each mining engineer. Is there enough of public spirit among the mining men of "North Wales, Salop, and Cardigan" to fall in with such a movement?

I presume that in his remarks about copper being found in limestone near Welshpool, "Hopeful" refers to the carboniferous limestone at Llanymynech, for I think it will be found that the Silurian limestone, such as they are between Welshpool and Meifod, or wherever they crop up in that region, have not as yet produced copper in any appreciable quantity. I do not agree with "Hopeful" that stratigraphically copper deposits of any magnitude are capricious. But the recent discussion on this question has, I think, been very useful, and it is by each one contributing his quota of observed phenomena that the truth is elicited. One pleasing feature of the discussion of this copper question is the courtesy with which it has on all sides been conducted. Referring again to the limestone at Llanymynech, mining for copper there has recently been re-started, and I wish the movement success.

#### REPORT FROM DERBYSHIRE AND YORKSHIRE.

Jan. 22.—There has been but little change of late in connection with the lead mines of Derbyshire, some few of which are turning out a fair quantity of ore; but with the present price of lead there is every reason to believe that the production of the present year will be considerably in excess of that of the previous one. Iron-making goes on much as usual, there being a good demand for Staffordshire on the part of the rollers, as well as for Lancashire, and some parts of the West Riding. A large tonnage of ore is imported from Northamptonshire, and less of the local stone is raised than formerly. In manufactured iron business continues in much the same state as it has been for some weeks past, and some descriptions sell rather freely. In house coal the business is what may be termed good, and a heavy tonnage is being forwarded over the Midland Railway to the Metropolis, as well as to the eastern and western counties. Prices, however, still rule low, Silkstones being delivered to consumers in London at 22s. per ton, which cannot leave much margin for profit to the colliery owner, whatever it may do to the merchant. There has been some talk of endeavouring to break down the monopoly of the latter of the London market, but that will be no easy matter. Yet there is no reason why the middleman should make all the profit and the colliery owner have to sell at a loss, as very many did during the greater part of last year. In steam coal business is still but moderate, whilst there is a fair quantity of gas coal being sent away in discharge of contracts. A good deal is sent from the Staveley pits to several gasworks; and here it may be stated that Mr. Eaton, of the company's colliery at Clowne, after the usual examination at Derby, received a Certificate of Competency as Colliery Manager.

In Sheffield trade has become more active in several branches, and there has been a considerable addition to the number of workmen employed, especially at the forges. At the Atlas and Cyclops Works there is a large production of mill material, more especially of ship-plates for the Admiralty for the construction of the Colossus and the Majestics. The armour-plate mills are also likely to be busier, whilst composite plates are being turned out for some foreign vessels of war building in England. There is a heavy consumption of hematite pig, the price of which has gone up very much of late, some brands realising as much as 74. per ton, being considerably more than double what it was three months ago. Finished iron has also gone up recently, bars being quoted at 94. 10s., and sheets at 134. 10s. per ton. In Bessemer steel business is brisk, and the consumption for rails and other material heavy and increasing. A considerable tonnage is absorbed in the manufacture of some descriptions of cutlery, axes, tyres, and connecting rods. But, of course, the great weight goes to the rail-mill. Heavy orders are on hand for America and India, and for some of the home lines, so that for some considerable time to come the mills will be kept fully employed. Sheep



shears are being rather extensively produced by machinery, which has led the men to offer to submit to a reduction of wages, so as to have them hand-made. Crucible steel is in better request, not only for cutlery but for structural purposes as well, and at Sir J. Brown's the Siemens-Martin process has just been introduced. At the foundries business is of a rather moderate character, although some of them are kept well going.

The coal trade in South Yorkshire is fairly good, and the men are kept well going, the principal business doing being in households for the southern markets. Colliery owners, however, still complain of the low price at which they are obliged to sell, leaving little or no profit. Steam coal has not materially improved, but rather more is being done in it with Lincolnshire, where there is an increased output of pig.

The men who have been on strike at the Birley Colliery, and who agreed to submit the question in dispute to arbitration, have withdrawn from the agreement. They are trying to arrange with the representatives of the company direct, but it is doubtful whether an arrangement will be the result. At Monk Bretton, near Barnsley, the men are still on strike, and the colliery standing. The men employed at the Barrow Hematite Company's Colliery, Worsborough, near Barnsley, have delivered notices terminating their contract. The notices do not state the grounds for the step somewhat suddenly taken, but it is believed that the men purpose demanding an increase of wages to the extent of 10 per cent., as that amount was taken from them about six months ago. In the present state of the trade, and the low prices that prevail, the company is not likely to make any concession. The notices will affect altogether about 350 men and boys, and it is not likely that the Association will be able to help any of them.

#### TRADE OF THE TYNE AND WEAR.

Jan. 21.—The exports of coal and coke from the Tyne ports, we learn from Brown's Export List, were 7,364,065 tons in 1879, and 6,550,546 tons in 1878, showing an increase of 808,519 tons. The Tyne still holds the first place, Cardiff the second, and Sunderland third for coal and coke exports. On the whole, the staple trades of the Tyne and Wear are steadily improving; the steam coal works north of the Tyne are employed fairly, but the price of this coal is still comparatively low, and colliery owners will not make large contracts for best coal at present rates, but some contracts have been made for second-class coals. It is expected that better prices will be secured for first-class steam coal as the season advances; the steam coal trade is firm, with a hopeful feeling. Gas and manufacturing coals have advanced about 6d. per ton; most of the colliers in Durham are well employed, and works closed during the long depression are being reopened in all quarters. At Consett the Deloist-lane Pit has been reopened. Old Throckley and Heddon Collieries are working full time. Old Hedley Hope Colliery, which has been closed three years, the property of Messrs. Samuelson and Co., is to be put in full operation as soon as possible. The Brandon Colliery, a large coking coal colliery near Durham, will also shortly be re-started. The coke ovens at present at work are not sufficient to meet the demand, and additional ovens will, no doubt, be built shortly at many works. It is remarkable that the house coal trade continues very flat, and although the winter has been severe little addition has been made in the price of this coal. Harton house coal is still quoted at 9s. per ton, and this rules the market to a great extent in this district. Coke is advancing in price rapidly, and its value is relatively far above the value of raw coal of any kind. Messrs. Strakers and Love and other firms have contracted to deliver coke at greatly enhanced prices; in some cases 20s. per ton has been got.

It is worthy of notice that in this district the longwall method of working coal has made considerable progress of late years, and in many cases the trials made of the system have proved successful, and will be continued. Of course, the nature of the roof is of great importance in connection with the method of working the coal seams, but there is another element in this question which has not, perhaps, received the attention it deserves, and this is the depth from the surface. It is the opinion of many engineers that seams found at great depths (say, 300 fms.) are not favourable for working longwall on account of the great pressure at this depth. Some collieries and iron mines were offered for sale in South Durham, on Tuesday, formerly part of the estate of Messrs. Charlton. The Evenwood Collieries, in South Durham, were first offered, but no offer was made for them. The Slapewath Iron Ore Mines, in Cleveland, were then offered. These mines are capable of turning out 1000 tons of ore per day for 20 years. Several offers were made for this mine, and ultimately Mr. Williams offered 20,000*l.* for them, and there being no higher bid the lot was withdrawn. The reserve price was not stated, but the works are likely to be disposed of privately.

The committee of inspection of Hopkins, Gilkes, and Co. (Limited), of Middlesbrough, met on Tuesday, and agreed to recommend the adoption of the reconstruction scheme to the shareholders. The 26,000*l.* fresh capital required has been nearly, if not all, subscribed, and there are now no difficulties in the way of reconstruction, seeing that the claim of the South Australian Government in respect of a rail contract has been favourably compromised. The works consist of blast-furnaces and rolling-mills, and will be soon started. The company is one of the largest in the Cleveland district.

The iron trade has been in an excited state during the past week, and there has been some fluctuations in prices; the prevailing quotations, however, have been 62s. and 62s. 6d. No. 3. The makers are very firm, and the general state of the trade is a warrant for this; little iron, however, has been bought, buyers holding off for lower rates, but these cannot be had while shipments continue so large. In the first half of the month shipments from the Tees amounted to 28,000 tons. The manufactured iron trade is improving; works are being got into operation which have been a long time idle in Stockton, Darlington, &c. The Skerne Iron Company is to be started to make ship-plates. The Moor Ironworks, at Stockton, are also to be started. Prices are improving in most kinds of finished iron. Bars are quoted 8*l.* 5s. to 8*l.* 7s. 6d.; angles, 8*l.* 10s. to 8*l.* 12s. 6d.; ship-plates, 9*l.*; puddled bars, 5*l.* 15s. There are large quantities of Spanish ore being brought into the Tees, and the production of hematite iron is increasing in the district.

At Middlesbrough on Tuesday the iron market was pretty steady; iron has been taken out of stock lately, makers have little in hand for present delivery, but they offer No. 3 for the first six months of the year at 65s. There are some doubts at present as to whether prices will rise or fall, but some hold out for higher rates. Heavy shipments continue to be made. The deliveries last week were over 20,000 tons; this is a very heavy delivery for the time of year. The great activity of trade is causing a scarcity of rolling stock on the North-Eastern Railway, and the mineral traffic has to some extent been impeded. The railway company, however, have ordered new wagons, and are doing all possible to meet the requirements. The West Hartlepool Rolling Mills, the Skerne Ironworks, and others are to be got into operation shortly. The manufactured iron trade keeps good, and there is a great pressure on the plate-mills. Ship-plates are 9*l.* to 9*l.* 2s. 6d. The traffic receipts of the North-Eastern Railway show an increase on all heads—that is for the week. The increase is very satisfactory, being 9165*l.* The chemical trade on these rivers continues to improve, and orders from America and the Continent are brisk, and the home trade for prompt delivery is also good. Prices are still expected to advance, although considerable advances have been realised of late. Bleaching powder is much enquired for, and parcels offered are eagerly bought up.

**THE IRON AND COAL TRADES.**—At Middlesbrough, on Tuesday, the collieries and ironstone mines of Messrs. R. Charlton and Sons, in liquidation, were offered for sale under an order in Chancery. Contrary to expectation, there were no bids for the valuable colliery properties in South Durham, which were estimated to be worth 200,000*l.* six years ago. For the Slapewath ironstone mines in Cleveland the bidding commenced at 5000*l.*, and was carried on between Messrs. Samuelson and Co., Mr. Edward Williams, Mr. H. Whitworth, and Mr. J. W. Richardson up to 20,000*l.* Mr. Williams being the last bidder; the lot was then withdrawn. It is probable that it will be disposed of by private contract.

#### Registration of New Companies.

The following joint-stock companies have been duly registered:—

**THE CARNARVON COPPER MINING COMPANY (Limited).**—Capital 20,000*l.*, in shares of 1*l.*. The purchasing or otherwise acquiring of a certain mining sett called Talynugneddissa, situate in the parish of Llanillyn, Carnarvonshire, or any other mineral property. To work and develop all such mines and mineral properties; to dress and make merchantable, sell, and dispose of ores and other minerals, and generally to carry on the business of a mining and smelting company. The subscribers (who take one share each) are—S. W. Daukes, Beckenham, gentleman; F. Braby, South Kensington, metal merchant; J. Y. Watson, 1, St. Michael's-alley, mineowner; N. F. Watson, 1, St. Michael's-alley, mineowner; C. B. Parry, Gracechurch Buildings, mining engineer; E. J. H. Truscott, 1, St. Michael's-alley, clerk; W. H. H. Watson, 1, St. Michael's-alley, shareholder. The directors to be elected at the first general meeting by the shareholders, the qualification being fixed at 50 shares. Remuneration 200*l.* per annum, to be divided amongst the board. Messrs. Watson are appointed treasurers.

**THE BLAINA FURNACES COMPANY (Limited).**—Capital 50,000*l.*, in shares of 100*l.*. To carry on at Aberystwith, Monmouthshire, the business of iron, steel, and other metal foundries, manufacturers, and merchants. The subscribers are—J. Spence, 115, Cannon-street, 80; D. H. Booth, Ipswich, 20; E. Gatto, Hampstead, 50; J. Dixon, 1, Laurence Pountney-hill, 30; A. Thorne, Kilburn, 20; F. Beesley, Dulwich, 20; M. W. Carr, 4, Woburn-place, 20.

**THE NEW FLORENCE MINING COMPANY (Limited).**—Capital 15,000*l.*, in shares of 1*l.*, 10,000 being ordinary and 5000 preference shares. To acquire, by purchase or otherwise, certain mines and mineral lands lately the property of the Florence Mining Company (Limited), situate at South Molton, and held by them under a lease from the Right Hon. Lord Poltimore, and also any other mining properties in the United Kingdom. The working, leasing, mortgaging, and selling of such mines, lands, buildings, quarries, pits, machinery, and other works, and the ores and minerals thereof. The smelting or rendering merchantable any ores, minerals, and earthen to be obtained from such mines and mineral lands. The subscribers (who take one share each) are—G. Herring, 6, Park-crescent, out of business; G. Bush, South Molton, C.E.; W. Herring, 1, Half-Moon-street, out of business; R. S. Gladstone, 1, Moogate-street, merchant; A. F. Baillie, 14, Great Wichester-street, merchant; J. M. Pritchard, 8, Warrford-court, stockbroker; E. K. Blyth, 10, St. Swithin's-lane, solicitor. Messrs. G. and W. Herring and Bush to be the first directors, the number being limited to five. The qualification 500 shares.

**THE BRISTOL PROPERTY COMPANY (Limited).**—Capital 100,000*l.*, in shares of 20*l.*. To carry on the business of a land, building, advance, and investment company in all its branches. The subscribers (who take 20 shares each) are—J. H. Smith, Bristol; H. R. Fargus, Bristol; H. C. Perry, Bristol; W. W. Hughes, Bristol; S. Fripp, Bristol; W. Trice, Bristol; C. J. Lowe, Bristol.

**STEAMSHIP CRAIGMORE (Limited).**—Capital 25,000*l.*, in shares of 10*l.*. To carry on generally the business of merchants and shipowners. The subscribers (who take one share each) are—W. Johnston, Liverpool; H. L. Smyth, Liverpool; E. Paul, Liverpool; T. Matheson, Liverpool; J. Raw, Liverpool; J. Roxburgh, Bolton; E. Johnston, Liverpool.

**THE UNION BANK OF ENGLAND AND AMERICA (Limited).**—Capital 1,500,000*l.*, in shares of 20*l.*. To carry on in Great Britain and elsewhere a banking business. The subscribers are—J. R. Bailey, 85, Gracechurch-street, 20; E. C. Maddison, 21, Lombard-street, 100; W. Morrison, 149, Clapham-road, 50; J. Milne, 40, Threadneedle-street, 50; C. Ayles, 85, Gracechurch-street, 20; H. J. Overman, New York, 50; W. Garthwaite, Islington, 10.

**THE MINNESOTA AND IOWA LAND CORPORATION (Limited).**—Capital 250,000*l.*, in shares of 10*l.* and 3*l.*. To acquire land in America, and to carry on the business of a land and investment company. The subscribers (who take one share each) are—T. Gryles, Barnes; J. Penny, 24, James-street; L. Scott, 3, St. James's-terrace; W. Temple, Lewisham; E. Fuller, Balham; C. W. Kirk, 148, St. Paul's-road; J. W. Tricker, Croydon.

**THE GARRETT SUBMARINE NAVIGATION AND PNEUMATOPHORE COMPANY (Limited).**—Capital 10,000*l.*, in shares of 1*l.*. To construct and manufacture for sale submarine torpedo boats, and other vessels, breathing apparatus, diving dresses, and pneumatophores. The subscribers are—E. Gabriel, Lynton, 1; W. A. Ladler, Manchester, 1; W. H. Clemesha, Stockport, 1; J. E. Layland, Kensington, 1; J. Garrett, Manchester, 2000; E. F. Moulin, 39, Finsbury-circus, 1; L. C. Alexander, Putney, 1.

**THE ECONOMIC COAL ASSOCIATION (Limited).**—Capital 20,000*l.*, in shares of 1*l.*. To carry on the business of colliery proprietors and coal merchants, acquiring for that purpose the business of the Yorkshire Colliery Company. The subscribers (who take one share each) are—T. W. James, 26, Stamford-street; C. W. Cordery, Peckham; A. H. Harrison, 21, Abchurch-lane; T. G. Irving, 39, Albany-road; J. Dryden, Brixton; W. P. Cooper, 69, Fenchurch-street; J. D. Scott, 339, Albany-road.

**CLARKE AND COMPANY (Limited).**—Capital 5000*l.*, in shares of 1*l.*. To manufacture and sell disinfectants and antiseptic compositions. The subscribers (who take one share each) are—T. V. Clarke, Brockley; W. Burne, 11, Clement's-lane; W. Maclerie, 18, Coleville-square; C. Lamb, Lewisham; W. G. Blagden, Denmark Hill; W. Giles, Hanwell; W. Caldwell, Clapham.

**THE WATERHOUSE LEAD MINING COMPANY (Limited).**—Capital 15,000*l.*, in shares of 2*l.*. The working the Waterhouse Lead Mine in the chapelry of Haydon and parish of Warden, in the county of Northumberland, dressing and vending the ore and other materials to be raised therefrom. The subscribers are—T. Harrison, Alendale, farmer, 200; E. Burnett, Newcastle, merchant, 200; H. Curry, Barington, widow, 200; R. Lister, Haydon Bridge, engineer, 500; G. Reed, Haydon Bridge, merchant, 25; J. Lee, Haydon Bridge, farmer, 25; J. Blenkinson, South Shields, gentleman, 270. No Articles of Association are registered.

**THE MENDIP PAPER MILLS COMPANY (Limited).**—Capital 80,000*l.*, in shares of 100*l.*. To purchase mills near Wells, Somerset, and to continue the business. The subscribers are—G. Dawbarn, Wisbech, 10; J. Taylor, 5, Tokenhouse-yard, 5; G. Lewis, 58, King William-street, 1; W. A. Carnock, Shepherd's Bush, 1; J. Y. Henderson, 14, Little Tower-street, 5; R. G. Dawbarn, Wells, 10; N. B. Downing, Henley, 10.

**MACMAHON TELEGRAPHIC NEWS COMPANY (Limited).**—Capital 25,000*l.*, in shares of 10*l.*. To adopt and carry into effect an agreement, and to erect and work between any office, residential club, place of business, &c., wires and apparatus for transmitting news. The subscribers (who take one share each) are—T. E. MacMahon, Shepherd's Bush; J. Peacock, Hammersmith; J. B. Amor, Circus-road; L. Lunley, 20, Montague-place; R. K. Clay, Dublin; S. Sharpe, 12, Devonshire-place; T. Sharpe, 41, St. James's-street.

**ELECTRIC LIGHTING APPARATUS.**—Some further improvements in electric lighting have been patented by Mr. R. WERDERMANN, of Princes-street. The upper or larger electrode is secured as heretofore by means of a clamp, but instead of attaching the said clamp to the fixed vertical rod or bar he connects to the clamp an arm, which is placed in a horizontal position, and is pivoted to a sliding piece on the fixed vertical bar in such a manner that it can move upon this pivot as its centre, and therefore the larger or upper electrode, with the horizontal arm, may rise and fall, describing a portion of a circle in its movement. The horizontal arm is carried beyond the vertical rod, and is provided with a screw thread upon a portion of its length, a nut being placed upon this screwed portion to serve as a balance to the larger electrode. By means of this nut the electrode may be balanced as desired, and the nut is to be so adjusted that this electrode will just overbalance it, and descend when not in contact with the point of the smaller or vertical electrode or carbon rod, and as the latter is consumed the larger electrode assists by its gravity in maintaining the proper connection with the smaller one. When the

carbon rod is entirely or nearly consumed the upper or larger carbon will have fallen to or nearly to the points of the guides, and the movable vertical rod will also have descended a proportionate distance. He so arranges the length of this rod that when this occurs its lower end will come into contact with a screw in an arm extending from the standard or pillar, and the electric current will therefore be provided with a short circuit—that is to say, it will not travel through the carbons but through the bifurcated arm of the two-armed lever to the vertical rod; thence through the screw with which the end of this rod is in contact, and thus to the line wire out of the lamp. Some portion of the vertical rod must be insulated. The carbons will thus be cut out of or detached from the circuit automatically, and the other lamps in the circuit will not be affected.

#### THE CARDIGANSHIRE LEAD MINES—TYNEWYDD.

Taking advantage of the present mining prosperity and enhanced price of lead, it is proposed to re-work the Tynewydd Mine—a promising property about three miles from Talybont and six miles from Llanfihangel station, on the Cambrian Railway—which was worked almost privately until about three years since, when, although the prospects were considered excellent, the depression then existing compelled the adventurers to succumb. The reports of the several mine captains and engineers who have inspected it are highly encouraging, and it is confidently believed that, with present prices of mineral, capital and energy will ensure remunerative results. Capt. Charles Williams, of Tyn-y-Wern, reports that there is a strong stream of water running down the property parallel to the veins, and that as there is an extensive watershed above reservoirs of large capacity could be made at a small cost; there is, therefore, an ample supply of water for all the purposes of the mine at command. The sett contains three strong and powerful veins, all of which have been worked upon, and fair quantities of metal obtained. The north vein is one of great promise, and has been opened upon for a distance of 10 fms., and for the whole of that distance the vein maintains its size and regularity, being over 4 ft. wide, containing ribs and patches of ore throughout. The south vein (Tynewydd) is everything that can be desired at the present depth, yielding rich ore in branches of from 1 to 3 in. solid. The vein, in addition to the lead ore, consists of beautiful quartz or spar, and cannot be surpassed by any mines in the locality. A 40-ft. water-wheel erected between the farmhouse and the mine will command all the veins, and be of ample power to carry on the work for many years to come.

The sett is described by Mr. Henry Tyack as very extensive. His report includes both Tynewydd and Voelglomen, which embrace within their limits four veins or lodes, one of which is the Mynydd Gorddu lode—the most northern lode in the property. This is the Voelglomen north lode, which forms a junction with the Mynydd Gorddu lode westward. On this lode an adit level has been driven eastward on its course some 20 fms., and a winze has been sunk below this level, near its mouth, about 9 fms. From these workings some good ore has been raised, dressed, and sold. This lode is about 4 ft. wide, underlying south, and has an excellent bearing. Further eastward than the mouth of this adit a winze has been sunk from surface on this lode about 3 fms., in the bottom of which it is said there is a course of ore. This could easily be proved by putting in a small tackle, and clearing it. After referring to the Mynydd Gorddu and Tynewydd north lodes, the first of which is a well-known valuable lode, and the second a comparatively new lode, which, however, has produced a large quantity of solid lead, and is about 6 ft. wide, he continues that the next is the Tynewydd south lode, on which an engine-shaft has been sunk to the adit 8 fms. and 9 fms. under. This 9 fms. is in the country rock on the north side of the lode. The same adit cross-cut which intersected Tynewydd north lode intersected this lode, west of which they have driven the adit about 10 fms., and has opened out good stopping ground, and from which a parcel of lead was sold for about 17*l.* per ton. The ore from this lode is pretty solid, and its value is enhanced by the silver it contains. This lode underlies south a little, and is about 5 ft. wide.

Messrs. John and Ebenezer Ellis, who have worked in the district as miners all their lives, also express a very favourable opinion as to the Tynewydd lode. They state that the lode has been trenced on the surface for about 20 fms., showing lead up to grass, and they have no doubt there are between three and four thousand pounds worth of ore in that distance between the adit level and the surface remaining uncut; they can trace the lode for several miles, and when it joins the Great Haven lode at a little to the east of the present workings a great deposit of ore may be expected. It is, they consider, certain to pay well, and there is no more conveniently situated mine in the county for working or water-power, and the carriage to Aberystwith is very easy.

The geographical and geological position of the property is prominently referred to in the report of Mr. Alfred Harper, the mineral surveyor to Sir W. W. Wynn, who considers it is all that could be desired, being within easy distance of the Llanfihangel railway station, on the Cambrian Railway, and intermediate with the celebrated Esgair-hir, Hafan and Hendlwh, and other rich mines, in the same band or channel of mineralised rock. The grant or sett is very extensive, and is traversed by several known and well defined lodes, which, being of various angles, form junctions in several places in the sett; consequently, speaking from analogy, it is only fair to infer that large deposits of ore will be found at these junctions, as has been the case in the surrounding mines. The lodes are embedded in a stratum of Silurian flag, or clay-slate, highly congenial to the production of lead, and is identical with that of the great lead-bearing lodes of the county, therefore good results may be anticipated from the development of the lodes. Voelglomen adit has been driven several fathoms into the hill on a very promising lode, as is evidenced by the nice ribs of ore to be seen in the roof of the level—at one place to the value of 15 or 18 cwt. per cubic fathom. The lode in the present end, although at present unproductive, is of a very promising appearance, its constituents being highly congenial to the production of mineral in large quantities. At the mouth of this level a shaft is being sunk. When this is down about 20 fathoms a level should be driven west on the lode, so as to intersect the Hafan and Hendlwh lode at the junction—a point of great importance for the future prosperity of the mine. This work should be pushed on with all speed. On the Tynewydd side of the brook an adit cross-cut has intersected two east and west lodes, known as the North and South lodes. The north lode, from the quantity of ground excavated, must have produced a great quantity of ore above the adit, and there is some very nice lead to be seen in the roof of the level at several places now. But, withal, very little seems to have been done below the level. Such is also the case with the south lode, where in one place in the roof the lode will produce about 20 cwt. of lead per cubic fathom. A shaft has been sunk about 9 fms. below this level, but is at present full of water. He advises that this shaft be cleared and sunk to a depth of (say) 15 fms., and the lodes proved in depth, when there is no doubt in his mind as to the result. This work could be accomplished without any great expense, as the new water-wheel is of sufficient power to pump from both shafts. The property has also been very favourably reported on by Messrs. Josiah H. Hitchens, T. Currie Gregory, and George Green, so there is no reason to doubt that it would be worth the attention of capitalists.

**MINING IN ITALY.**—A recently published official report of Italian Minister of Agriculture, Industry, and Commerce gives some statistics relative to the state of the mining industry in Italy. The principal mineral product is sulphur, of which an annual value of 1,000,000*l.* is produced. Lead comes next, the value of this metal produced in 1877 being 383,000*l.*; while that of zinc was 179,000*l.* of iron, 115,000*l.*; and of copper, 58,500*l.*

**EPPE'S COCOA—GRATEFUL AND COMFORTING.**—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, M. Eppe has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—*Civil Service Gazette*.—Sold only in packets labelled—"JAMES EPPE and Co., Homoeopathic Chemists, London."



## Meetings of Public Companies.

## FRONTINO AND BOLIVIA GOLD MINING COMPANY.

A special general meeting of shareholders was held at the offices of the company, Gresham House, Old Broad-street, on Thursday, Mr. THOMAS EYRE FOAKES in the chair.

The CHAIRMAN said what the meeting really met for was this; when he last had the pleasure of meeting the shareholders a resolution was passed unanimously that this company should subscribe a sum not exceeding 1500*l.* in debentures of the Antioquia Company, but he was very happy to tell them that without troubling this company at all over 5000*l.* of the debentures had been subscribed for. (Hear, hear.) This was very satisfactory to him, as it showed that the shareholders had confidence in the manager out there, and he thought in the directors also. His opinion was that the Antioquia property would turn out very satisfactorily. He would not trouble the shareholders by again pointing out how much this company was interested in the Antioquia, except to remind them that they had about 4000*l.* of the purchase-money still owing, and one-third of the Antioquia capital. Under the Articles of Association the Frontino and Bolivia Company was at liberty to make a reserve fund, and to take from the profits whatever sum of money they thought they ought to take to put it to that reserve fund, and when this reserve fund should have been created the directors had power to invest it in such a manner as in their judgment they might think fit. In the ordinary course the directors would invest it in Government or some easily realisable securities, but it occurred to him that it would be a wise thing for the shareholders to pass a resolution to have power to advance a sum of 1000*l.* to the Antioquia Company at any future time. He did not think it would be necessary for them to subscribe for such an amount, but he thought it would be wise to take the precaution of having the power to advance this extra 1000*l.* if necessary, and he would propose "That, in the opinion of this meeting it is expedient that this company should, if it be required, subscribe for a sum not exceeding 1000*l.* of any debentures to be issued by the Antioquia (Frontino) Company (Limited)." He would be very happy to hear any suggestion the shareholders might have to make, but this seemed to be the best way of dealing with the matter. The directors would not advance the money unless it were really required. They were aware how often it was that even under the best management something might occur to throw the working of the mine out for three or four months, perhaps just on the eve of success, and at such times it was very difficult to get the money required. Already 5200*l.* of the debentures had been subscribed for, but the directors would limit the issue to 5000*l.* The Chairman then proposed the resolution.

Mr. W. BAXTER seconded the resolution.  
Mr. R. M. HAY thought the resolution a very proper one, and asked whether the company would be tied down to the single purpose mentioned?  
Mr. BAXTER said the resolution merely gave the directors power to subscribe for a debenture of 1000*l.* if they should think fit hereafter; but it did not tie them down to this at all.

The CHAIRMAN added that as a matter of fact the directors were not obliged to consult the shareholders with regard to this matter, as they had the power already in the Articles of Association (article read); but their principle had always been to treat the shareholders with the confidence that they had always given to the board, even in the most difficult times.

Mr. DONAGAY said: As the debentures were going to be issued to the full extent of 5000*l.*, he wished to know whether the 1000*l.* of the last issue of the shares were still unsold?

The CHAIRMAN replied that 1100 shares of the old issue were still unsold; but he thought that the mine would produce so well in the course of the next six or eight months—when the machinery was got to work—that if they wanted any capital those 1100 shares would be available to be issued without any debentures at all.

The resolution was then carried unanimously.  
The CHAIRMAN then said: The directors had been unfortunately obliged, in the interest of the company, to deprive the shareholders of dividends for some time, as they had been spending 5000*l.*, 6000*l.*, and even 8000*l.* a month out of the profits in the development of the mine, such sinking shafts and driving levels. This was, of course, a very expensive operation, and it was not that the mines were so rich it would have been impossible to have made any profit out of them; but, fortunately for the company, the ore taken from the levels and the lodes had given them 1000*l.* and more profit a month. It occurred to him that they had better take the opportunity which they could now avail themselves of creating additional capital to the extent of 5000 shares, but only issuing 2500, which would produce 5000*l.*, and whatever they might get as a premium on the issue of the shares. This would give them the funds necessary to develop the mines, to erect mills, and to do other things which were now almost completed. He hoped that such an amount as 2500*l.* would not be necessary; but if the directors had such a sum they would be able in a very short time—perhaps in six weeks from hence—to give the shareholders a dividend at the rate of 1*s.* per share dividend out of the profit, and to continue a like payment quarterly. The shares were now quoted at from 3*l.* to 3*l.* 5*s.*, and he thought, in justice to the company, they ought not to issue the shares except at a premium of 10*s.* or 12*s.* 6*d.* each, offering them first rateably to the shareholders. If they got 10*s.* premium they would have a clear profit of 1250*l.*, upon which they would have no liability to pay any dividend. He had talked this matter over with some of the largest shareholders, who had expressed themselves favourably with regard to it. He thought it would give the shareholders a good deal of encouragement and comfort if they got their dividends pretty regularly; and, as a dividend-paying concern, it would give the company in the eyes of investors a tone which it could not otherwise possess. Of course, they could do nothing but talk the matter over at that meeting, as it would be necessary to deal with such a matter at two special meetings; but he thought it just as well to mention it, so that the shareholders might consider it, and be prepared to discuss it at the general meeting which would be called shortly. His colleagues and himself were certainly in favour of this measure, as it would enable them to divide the profits made amongst the shareholders. At the present rate of profit they could give 1*s.* per share every three months; but if Mr. White was anything like correct in his estimates there was no reason why they should not have 2*s.* per share a quarter at no distant date. Silence was given 5*o.* of gold per ton, and Palmichala as much as 6*o.* per ton at the shaft. The other properties were also yielding well, and as the stone-crusher was now dispatched to the Cecilia Mine he believed they would have large returns of gold for that property also.

Mr. HAY asked if the company was in want of capital?—The CHAIRMAN replied that they were not absolutely in want of capital, but while they were spending 6000*l.* out of 10000*l.* a month profit they could not pay the shareholders dividends. A great saving was now being effected by purchasing the stores in this country, but to do this it was necessary to have some capital in hand.  
Mr. BAXTER, in the course of some conversation, stated that though he was opposed to the suggested increase of capital at first, he now thought it would be a very wise and prudent thing to do, and he recommended the Chairman.

On the motion of Mr. L. L. LOWE, seconded by Mr. DONAGAY, a vote of thanks was passed to the Chairman, and the meeting then terminated.

## ABERLYN MINING COMPANY.

An ordinary general meeting of shareholders was held at the offices of the company, Gracechurch-street, on Thursday, Mr. J. Y. WATSON, F.G.S., in the chair.

Mr. C. B. PARRY (the secretary) read the notice convening the meeting. The directors' reports was as follows:—

The directors, in presenting their report, have to state that the accounts, which are in the auditor's hands, and will be presented to the meeting, show a cash balance in hand of 2309*l.* 5*s.* 10*d.* The machinery has been made complete by the erection of a new stone-breaker, has cost a large sum of money to purchase and erect, and has taken somewhat longer time than was at first anticipated, but is now in a very efficient state and capable of dressing large quantities of ore. The shareholders are aware that the great Gorse lode of the D'Eresby Mountain runs through Aberlynn for 300 fathoms in length, and has been opened upon by three adit levels into the hill, where the lode at these comparatively shallow depths has yielded 8 to 10 and 12 tons of blende per fathom. The agent, before the company was formed, estimated the value of the blende at 12,000*l.* he now, in one section alone on the hard lode, estimates the reserves at 22,000*l.*

The machinery was started in May last, and the directors sent Capt. Rowe, late manager of the Great Laxey Mines, and of great experience in lead and blende, to inspect and report upon it. [A copy of his report is enclosed.] Since Capt. Rowe's visit 147 tons of blende have been sold, and but for the frost which set in early in December and stopped all dressing operations till early in January, the sales would have been much greater. The agent's report will show more in detail what has been done at the mine, and the directors consider they may congratulate the shareholders upon having a valuable property, and one that may soon become highly remunerative. The directors have also to add that the vendor has lately handed over to the company, free of charge, a valuable extension of set on the run of the Griffin lodes.

The mine is worked cheaply by extensive water power, and by means of a tram and incline the dressed ores are carried from the floors to the carts within one mile and a half of the railway station. On Dec. 30 last Mr. A. Waters, of Roman Gravel and Tankerville, inspected the mine, and a copy of his report enclosed. After the general meeting a special meeting will be held to carry out the wishes of the principal shareholders—to divide the shares by ten, so that each 10*l.* share will have ten shares 1*l.* paid. Mr. Edward Ashmead, the auditor, offers himself for re-election.

The CHAIRMAN said he had very little to add to the reports of the directors and agents which had already been circulated amongst the shareholders; he would state, however, that the capital account would be closed with a reserve fund of 2000*l.*, and from Jan. 1 the current costs—about 1600*l.* per month—would be set against the current returns and profits shown. The agent informed him that the last 50 tons of blende sold at 3*l.* 17*s.* per ton, was of an inferior quality, and that he would sample 50 tons this month, worth about 5*l.* per ton, which would give a good profit. Before the company was formed the agent estimated the ore in reserve at the hard and soft lodes together at 12,000*l.*, but he now estimated that in one section of the hard lode alone the ore in reserve was worth 22,000*l.*, so that with efficient machinery, plenty of water and stuff in reserve he ought to continue to make good profits; but the main object in prosecuting the mine was for lead, which they hoped shortly to get into.

Capt. ROWE, in reply to a question, stated that the blende made in large bunches of from 10 to 20 and 30 tons. They had a lode worth 2½ tons to the cubic fathom just now.

The CHAIRMAN said that when Capt. Roberts estimated the ore in reserve he estimated the soft and the hard lodes together, but his latest estimate was upon the hard lode alone, and the soft lode was not calculated at all.

Sectional plans were then produced, and Capt. Roberts explained the nature

of the operations, adding that the blende in the lode was now worth 2½ tons per fathom, and that it would fetch in the market 5*l.* 10*s.* per ton.

Dr. PETT: With the blende alone without the lead you will be able to declare a dividend, as I understand?—The CHAIRMAN: I said make a profit: 50 tons a month at 5*l.* per ton will give us a good profit, but we hope to go much beyond that.

Capt. ROWE: We are gradually working up to 100 tons. We are in the side of the mountain in a steep ravine, and we are gradually extending the dressing-floors.

The SHAREHOLDER: Then there is stuff enough?—Capt. ROWE: Yes; any amount of it.

The CHAIRMAN: There are over 1000 tons of blende broken, and they use a lot of it as sort of stuff till they get to the top of the slope.

A SHAREHOLDER: Do I understand that you have no dressing-floors?—The CHAIRMAN: Oh no; we have dressing-floors enough to return 100 tons a month, but Capt. Roberts is extending them as he goes on. We have kept the costs down as much as possible.

Mr. DAVIES: A mine, you know, takes some time to open out.

The CHAIRMAN: You cannot show me a mine that has ever been brought round as this one has in twelve months. Capt. Roberts understands that we must have all the blende sold possible now that its price is good. Our costs are 160*l.* per month, but they will be met, as I have told you, out of returns. We have a lode from 18 to 21 ft. wide all the way. More than 1000 tons are lying there broken.

We have 300 fms. of the D'Eresby Mountain lode; they are in lead, we are in blende, but we shall get into the lead as sure as they have got into it.

Capt. ROWE then exhibited some specimens of the country rock, &c., the indications of which were, he said, everything that could be desired for producing lead. Taking the bearing of the lode they had 15 fms. yet to drive to get upon the back of the lode.

Dr. PETT: How many fathoms a month do you drive?—Capt. ROWE: We drove 4 fms. last month. The rock is hard, but it cuts well. We have 200 fms. of a large lode that has never been touched, and this adit cross-cut will cut it all the way 30 fms. deeper than anything yet seen to prove the piece of ground, and it is in this beautiful formation. I do not know of any mine that can be worked cheaper than this. When we need it we can easily increase our power by erecting a number of water-wheels. We have an abundance of water-power.

Mr. HERITAGE: Capt. Roberts, you have a mine, you have the ore, you have the water, and if you do not make something for us—I will not add the rest.

(A Voice:—He will go into the reservoir.—A laugh.)

A SHAREHOLDER: Is that in the resolution?—The CHAIRMAN: I have looked at the resolution, and cannot find it there.

Mr. BARGE proposed "That the report and accounts now presented be received and adopted."—Dr. PETT seconded the proposition, which was carried unanimously.

Dr. PETT moved the reappointment of Mr. Edward Ashmead as auditor.—Mr. HERITAGE seconded the motion, which was carried.

The meeting was then declared special.

The CHAIRMAN said that many of the shareholders had expressed a wish that the 10*l.* shares should be sub-divided. So far they were unanimous on this point; but it was for anyone in the meeting to raise an objection if he thought fit. The matter was a very simple one, and the rage of the present day was for smaller shares, as they were easier to deal with.—Mr. DAVIES concurred in this.

The CHAIRMAN added that they had a substantial addition made to the sett. The only trouble it would cost them would be registration, which could be done for a trifling charge.

Mr. DAVIES moved "That the present capital of the company, instead of being in 5500 shares of 10*l.* each, be sub-divided into 25,000 of 1*l.* each, and that the Memorandum of Association of the company be altered in accordance with the above special resolution."—Mr. HERITAGE seconded the motion, which was carried unanimously.

The meeting closed with a vote of thanks to the Chairman.

## SOUTH CARADON MINING COMPANY.

At a general meeting of shareholders, held at the mine on Tuesday (Mr. RICHARD HAWKE in the chair), the accounts for September, October, and November showed a profit of 1029*l.* 3*s.* 4*d.* A dividend of 768*l.* (1*l.* 10*s.* per share) was declared, and 2542*l.* carried to credit of next account. The following report was read:—

Jan. 20.—I am pleased to say our mine is still looking well, yielding large quantities of good quality ore, with every reason to believe it will continue. Holman's lode has recently been interested in the two bottom levels, the 200, Rule's shaft, and the 180, Kittow's shaft—is looking very well; this I think is something to encourage us to explore the mine deeper, which we intend to commence doing at the end of this month. We are also glad to observe the hopeful state of the copper market, which will still further augment the value of the mine.—JOHN HOLMAN.

WHEEL COMFORT AND NORTH TRESAYAN.—At the meeting on Monday (Mr. John L. Peter in the chair) the accounts showed a loss on the 16 weeks' working of 867*l.* 2*s.* 7*d.*, and a balance of liabilities over assets of 1147*l.* 11*s.* 3*d.* A call of 5*s.* per share was made. Capt. Josiah James reported favourably upon the prospects of the enterprise. He congratulated the adventurers on the success they have met with in the western ground. About three years since they drove a cross-cut at the deep adit to intersect some branches that would form a junction with the south tin lode, but soon after the price of tin went so low that he thought it was not worth seeking after, and stopped the work. About a month since he again put two men to drive that end, and they have now a well-defined lode, about 4 ft. wide, and worth 24*l.* per fathom. This is a good discovery, as they have the length of a good sett in this direction, and the 50-fathom back. The end is now set to six men at 9*l.* per fathom, and four men are stopping in the back at 5*s.* 6*d.* in 1*l.* There are two pitches being worked on Morcom's tin lode, east of the cross-course, by four men at 13*s.* 4*d.* in 1*l.* Capt. James thinks that at the present price of tin they can pay about the whole cost of the mine. When they begin to re-work on the copper lode their cost will, of course, be considerably increased, but they will then be able to leave a good balance monthly.

## MINING IN IRELAND.

At the Mining Company of Ireland half-yearly meeting, held at the offices in Dublin a few days since, under the presidency of Sir Robert Kane, L.L.D., the directors in their report recommended a dividend of 2*s.* 6*d.* per share, leaving 776*l.* to be carried over to next account. From the explanations given by the Chairman, in moving the adoption of the report, it appeared with reference to a sum to the credit of profit and loss arising from the overplus of the sales of stores and old machinery and miscellaneous materials remaining at Knockmahon Mines after payment of the necessary expenses incurred during the half-year, that the arrangements for the surrender of the various impediments at Knockmahon had been to a certain extent carried out, and that further progress in that direction would follow as circumstances admitted. Regret was expressed that during the financial half-year just ended the results of business at the collieries had been so unproductive, leaving as they did upon that period a profit upon the transactions of only 456*l.* 10*s.* 4*d.* As a matter of fact, the almost unprecedented depression of the country, as regarded the existing commercial depression and consequent destitution had reduced the sales to a considerable degree below those of the half-year immediately preceding—a reduction far more serious than had taken place in former crises, the amount of coal and culm sold being upwards of 2000 tons less in the half-year just ended than in the preceding half-year. In addition to these most untoward results, the profit which should and would have accrued was still further and seriously reduced by the imperative necessity under which the directors felt themselves of reducing the price of culm so far as they consistently and practically could—to make any profit, partly from the obligation to do so to enable them to transact business, and partly to meet, as far as fairly within their power, the depressed and still suffering portions of the districts which the company supplied. The Chairman expressed an ardent hope that a better season and restored national prosperity would ere long render their collieries capable of proving as remunerative as formerly. With regard to the Laganine Mine, in the county of Wicklow, the searches had on the whole proved unproductive. Certainly, there had been some indications of produce in various workings recently commenced, but not of sufficient importance to meet the required expenditure, and there had, consequently, been a total loss in those particular observations on the ground, and loss account. Since the date of the report (November 30) the price of lead had still further increased. The price per ton for pig-lead in November was 17*l.*, whereas at the date of the previous account it was only 13*l.* 10*s.* Now, they would find that at the present date it had advanced to upwards of 19*l.*, with a reasonable probability of a further increase, so that if the stocks in the account were valued at the present date, in about three months, or perhaps less, they would amount to about 2500*l.* more than was now represented. Still, that was a matter for future consideration, and at any rate could not now be either entertained or acted upon. If an improvement should fortunately take place, then, of course, due and favourable allowance would be made in the next statement of accounts presented.

The report and statement of accounts were passed unanimously, and it was further resolved that a dividend at the rate of 2*s.* 6*d.* in 1*l.*, free of income tax, be declared for the half-year ending Nov. 30. The outgoing directors—Messrs. Henry Allen and John Edmund Barry—and the retiring auditors—Messrs. John Edward Fottrell and Henry Guinness—were re-elected, and the proceedings closed with a cordial vote of thanks to the Chairman.

GREAT REVIVAL IN THE NORTH OF ENGLAND IRON TRADE.—The revival in the iron trade has effected in a most marked manner the values of the shares of the iron and coal companies in Cleveland and the North of England. The shares of the Darlington Company

within a fortnight have risen nearly 100 per cent., from about 6*l.* to 11*l.* 10*s.* or 12*l.* on 15*l.* paid. A few months ago the shares were sold by some holders as low as 1*l.* or 30*s.* per share. In September, Messrs. Boleknow, Vaughan, and Co.'s shares, 100*l.* fully paid-up, were below par; they are now at 155*l.* The Consnet Spanish Ore Company's shares have advanced above 50 per cent. in the same period. The Consnet Iron Company's shares, 7*l.* 10*s.* paid, have largely advanced, and are worth 24*l.* or 25*l.* The West Cumberland Iron and Steel shares, 20*l.* paid, which were 15 to 16 dis. in September, are now less than 5 dis.

THE CRANSTON ROCK-DRILL.—At a time when so much is heard of American manufactures driving the English out of the markets which they formerly enjoyed, it is gratifying to learn that English machinery also secures appreciation in the United States; the fact, no doubt, is that the jealousy which formerly existed between the two countries has died away, and each now recognises that the other excels in certain specialities useful to themselves, and that there is, therefore, plenty of room for interchange of business with advantage to both nations. It is really remarkable that so progressive a people as the Americans have done so little with machine mining, but this may probably be attributed to the fact that the greater necessity for the introduction of rock-drills in Europe led to more strenuous efforts to perfect them. Mr. Cranston, of Newcastle-on-Tyne, is just shipping another consignment of his rock-drills and air-compressors to America. This is the more gratifying, as it will be remembered that at the commencement of his career he had to encounter fierce opposition, and even defend his rights in Chancery; the results, however, were entirely in his favour, the validity of his patents were established, and his opponents had to pay him all costs. The Cranston drills and air-compressors are now employed throughout the world by many of the most enterprising and successful companies, which is, undoubtedly, one of the best proofs of their economy and efficiency.

## FOREIGN MINES.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received Dec. 30, ex Tagus (s.), dated Morro Velho, Dec. 2:—

GENERAL OPERATIONS.  
GOLD EXTRACTED TO DATE.—The produce for the second division of November, a period of eight days, amounts to 7949*o.* 9*o.* 917*o.* 5*o.* 7*o.* 10*o.* It has been derived as follows:—

	Ozts.	Tons.	Ozts. per ton.
General mineral	5770 <i>o.</i> 8 from 860 =	6 <i>o.</i> 710	
Mineral free from killas	1798 <i>o.</i> 5 " 236 =	7 <i>o.</i> 620	
Re-treatment (Arrastras, Morro Velho)...	7559 <i>o.</i> 3 " 1096 =	6 <i>o.</i> 908	
ditto (Praia) .....	249 <i>o.</i> 3 " 31 =	0 <i>o.</i> 220	
ditto .....	128 <i>o.</i> 3 " 16 =	0 <i>o.</i> 115	
Total .....	7949 <i>o.</i> 9 " 1096 =	7 <i>o.</i> 249	

MINES.—Return of duty for 12 working days:—  
Mineral raised from the mine ..... 2278 tons. |  || Mineral quarried per borer per diem ..... | 1*o.* 70 " |  |
| Average number of borers daily ..... | 111*o.* 33 " |  |
| Average number of natives daily ..... | 218*o.* 75 " |  |

MEASUREMENT FOR OCTOBER AND NOVEMBER:—  
Sump-shaft sunk vertically ..... 6 ft. 5 in. |  || The width of forebreast varies from ..... | 34 ft. 0 in. to 23 " |  |
Average width .....	31 "	
Width of first stop east of indent .....	39 "	
Mineral of good appearance .....	18 "	
DRIVING.—277 A extended .....	18 "	
278 A extended .....	2 "	
Ground in forebreast still disordered with killas and quartz .....	6 in.	
Total rainfall for November .....	6 in.	

Advices received Jan. 19, 1880, ex Mondego (s.), dated Morro Velho, Dec. 15:—  
GENERAL OPERATIONS.—The breakage of the pumping machinery recorded in last month's report will explain the unusually low produce of gold.  
Stopping operations in the sump and adjacent stopes were suspended until the 17th inst., owing to the great influx of water. In other respects the general work of the establishment has been satisfactorily performed.

GOLD PRODUCE FOR THE MONTH OF NOVEMBER.—The gold extracted during the above period amounts to 29,782*o.* 3*o.* 343*o.* 414*o.* 7*o.* 10*o.* It has been derived as follows:—

	Ozts.	Tons.	Ozts. per ton.
General mineral	21,584 <i>o.</i> 6 from 3622 =	5 <i>o.</i> 959	
Mineral free from killas	6,929 <i>o.</i> 8 " 949 =	7 <i>o.</i> 302	
Re-treatment arrastras, Morro Velho .....	28,514 <i>o.</i> 4 " 4571 =	6 <i>o.</i> 238	
ditto .....	827 <i>o.</i> 8 " 101 =	0 <i>o.</i> 181	
ditto .....	440 <i>o.</i> 1 " 56 =	0 <i>o.</i> 096	
Add recovered from Praia sand .....	29,782 <i>o.</i> 3 " 343 " 414 " 7 " 10 "		
Total .....	29,811 <i>o.</i> 9 " 4571 =	6 <i>o.</i> 515	

The duty of the stamping mill is less by 539 tons. The average yield per ton of low grade killas, however, been maintained, notwithstanding the treatment of a large body of low grade killas. COST AND PROFIT.

Produce for November ..... 29,811*o.* 9 |  || Loss on melting ..... | 96*o.* 6 |  |
Total .....	29,782*o.* 3		
Add recovered from crucibles .....	20*o.* 8		
Total .....	29,803*o.* 1, at 7*o.* 9*o.* 91*o.* 5*o.* 7*o.* 10*o.* =	£11,543*l.* 17*s.* 2*d.*	

Labour ..... Rs. 44,234 |  || Other charges ..... | 32,842 |  |
Total .....	77,077	
Reis .....	77,077	
at 21½*d.* per \$ .....	£6,904	

Profit for the month ..... £4,645 |  || MINES. |  |  |
Mineral raised from the mine .....	4531 tons.	
Mineral quarried per borer per diem .....	1*o.* 70 "	
Average number of borers daily .....	98*o.* 80 "	
Average number of natives daily .....	200*o.* 96 "	

EASTERN SECTION.—During the unwatering of the sump and sections west thereof the supply of mineral was derived from sections 237 A and 277 D. The lode in the former sections, principally high-grade pyritic stone, maintains its previously reported width and quality. From section 277 D the mineral has been of a mixed and poor quality. The extraction of mineral from this point will shortly be suspended, the stopes now being within the run of ground or "lar" of killas intended to be put to the mine. The sump shaft has been sunk 6 ft. 5 in. vertically, and the A shaft lengthened 54 feet.

PRODUCE, COST, &c.  
Produce as above ..... 938*o.* 0 |  || Loss on melting ..... | 5*o.* 9 |  |
| Total ..... | 932*o.* 1, at 8*o.* 1*o.* 91*o.* 5*o.* 7*o.* 10*o.* = | £376*l.* 14*s.* 5*d.* |  |
| COST ..... | 604*l.* 19*s.* 5*d.* |  |

Expenditure on capital account in excess of produce ..... £228 |  || The output has been solely derived from the sink in the bottom of the north-west level, Serrote section, referred to in last month's report. Vertical depth, 24 ft.; width of lode excavated ranging from 24 to 40 feet. As an exploratory work, with the view to ascertain the condition and the character of the lode at greater depth, the result is most satisfactory. Owing to the increasing quantity of water it has, however, been accomplished with some difficulty and expense, and will now be suspended. Level north-west Serrote has been extended 13*l.* 2*o.* 23 feet. |

GOLD EXTRACTED TO DATE.—The produce of the first division of December (a period of 11 days) amounts to 11,406*o.* 9*o.* 917*o.* 5*o.* 7*o.* 10*o.* It has been derived as follows:—

	Ozts.	Tons.	Ozts. per ton.
General mineral	8,190 <i>o.</i> 0 from 1483 =	5 <i>o.</i> 522	
Mineral free from killas	2,609 <i>o.</i> 4 " 386 =	6 <i>o.</i> 760	
Re-treatment, arrastras, Morro Velho .....	10,799 <i>o.</i> 4 " 1869 =	5 <i>o.</i> 773	
ditto .....	371 <i>o.</i> 0 " 46 =	0 <i>o.</i> 198	
ditto .....	136 <i>o.</i> 5 " 17 =	0 <i>o.</i> 073	
Sundry ditto .....	100 <i>o.</i> 0 " 12 =	0 <i>o.</i> 054	
Total .....	11,406 <i>o.</i> 9 " 1869 =	6 <i>o.</i> 103	

MINES.—Return of duty for 13 working days:—  
Mineral raised from the mine ..... 2,670 tons. |  || Mineral quarried per borer per diem ..... | 2*o.* 20 " |  |
| Average attendance of borers daily ..... | 63*o.* 38 " |  |
| Average attendance of natives daily ..... | 198*o.* 45 " |  |

The Gold Thorp, conveying 31,875*o.* 4



## Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES.—No. CXLIII.

(Continued.)

BY J. CLARK JEFFERSON, A.R.S.M., W.H. SC.,  
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## BROKEN WORKINGS, OR WORKINGS IN THE BROKEN.

This, which we have placed as the last amongst the methods of working without the use of attle packing is scarcely to be called a method of working, except in such cases where the ground is unbroken, when the method noticed in the last lecture, called Stockwerksbau, is combined with Bruchbau. Such an arrangement carries the name of broken workings in storeys. Broken working, in the strictest meaning of the term, refers to workings in broken masses, generally the result of the breaking in of the ground where the permanent pillars and ribs have been left in the abandoned portion of the mine. These having given way, and the ground having fallen and become settled, it is considered worth while to attempt to extract some portion of the mineral mass which formed the pillars and ribs. Sometimes only the ribs give way, and the debris falls in between the pillars which steady the loose mass, so that in this case the timbering does not require to be so strong as when the mass is so loose that as soon as an opening is made anywhere the loose ground commences immediately to roll through. Such broken ground is termed quick or alive, and necessitates the use of strong spilling timber in the level. The end of the level is breasted up, and any ore ground which rolls through is sorted out. The level is driven into the broken in the direction in which it is thought most likely to meet with ore portions of the deposit which may have been left behind as pillars and ribs. When such a spot is reached the broken ground is induced to roll through an opening left in the timbering, from which the valuable pieces are picked out. By driving up the spilling boards the rolling in of the loose material can be easily controlled. It is of the greatest importance to the safety of the level that no open spaces should be left anywhere behind the timbering. In some cases the driving and working out of the broken from a single level will last from 10 to 12 years.

\* Being Notes on a Course of Lectures on Mining, delivered by Herr Berggrath Dr. VOY GRONDECK, Director of the Royal Bergakademie, Clausthal, The Harz, North Germany.

## MINING ENTERPRISE IN COLORADO—THE ELK MOUNTAINS.

An interesting and instructive article on Colorado generally, and the Elk Mountains in particular, has been contributed to the Chicago Field by Mr. C. S. Boucher, who has favoured us with the advance sheets, from which the subjoined abstract is made. Colorado, he says, has made giant strides to a world-wide importance. As recently as 1858 the beautiful Queen City, Denver, was represented by a single shed, and even in 1873 Colorado and Denver were only incidentally mentioned in a reference to Pike's Peak. Now it concentrates interest and capital not only from the east and the west, but from the world. Its bountiful storehouses of silver and gold and other minerals, its fine herding and agricultural advantages, with its magnificent climate, are the factors. It is the purpose of this article to refer specially to the new and wonderfully rich mineral district included in the Elk Mountain belt, in Gunnison county, now in its swaddling clothes of discovery and development, but already the cynosure and goal of thousands of eyes. Denver, to an extent, is an index of the State's growth. Leadville is more typical of a strictly mining growth. Denver is the centre which gathers, and from which radiates, the nucleus in main of the State's new settlements, and it in turn drains these new settlements, and many are the princely fortunes that locate in the charming metropolis. Its growth in every way during the past year has been greater than in any year of its history. From 1200 to 1500 dwellings have been put up in this time, yet it is scarcely possible to secure a house. The resident population is estimated at 40,000, and possibly reaches 45,000. The topography of the Gunnison River mining belt may be likened to a fan. At the end of the handle is the town of Gunnison, in a spreading level commanding park: 30 miles from this is the town of Crested Butte, at the other end of the fan handle. From this latter general point as an apex the gulches that bear the precious minerals radiate as the rays of a fan. First, to the south and east, is the Copper Creek, where the first very rich discovery was made May 28, 1879, by the Jennings Brothers, and named the "Silverite," carrying native silver, sulphurets, arsenical iron, and massive red or ruby silver, running from the hundreds to the thousands of dollars per ton. It is at present owned by Obadiah Sands, of Chicago, and two other parties associated with him, who purpose working it privately. It is a magnificent property. There are many other rich localities in this gulch of the above-named ore, also of grey copper, galena, &c. Next, to the west, come the gulches of East river, and the head of Rock Creek, that have an abundant supply of low-grade ore, galena chiefly, carrying (say) from 50 ozs. to 150 ozs. per ton. To the north and east of these are Rustler and Maroon, localities where very rich finds have been made. Again, to the west is Washington gulch, whose little stream drew the gold hunters of 1860-61, and still generously pays those who wash in it. This gulch is destined for a bright future, and will draw a large settlement. At its head are the Betsy and Jersey Blue localities, made in 1878 by the Dr. Jennings Company of New Jersey; vast deposits of carbonates of lead and galena that give mill runs ranging about \$200 silver and \$30 gold to the ton. George McKay, of Topeka, and the old man Baxter also made localities in this gulch in 1878 that are giving very handsome showings in the harder ores. Rich gold and silver lodes are in store for the fortunate prospector in Washington gulch. On its western "hog back," or divide, are important deposits of both bituminous and anthracite coals. The next gulch to the west is Slate river, where there are many valuable locations of galenas and carbonates and the harder quartz ores.

Next to this, west is Coal Creek, the most important one in the district. The first discovery was made June 6, 1879, by the Iowa Smelting Company, of seven lodes carrying ruby silver, the average tests of which gave 1200 ozs. to the ton. As soon as this became known it was the target of prospectors, and scarcely a mining history has such discovery and development been made as in three short months in this gulch. Hundreds of valuable locations have been made, and among them lodes that will challenge the world. The Forest Queen, located July 5, carries massive ruby, native and arsenical ores of from 250 to 20,000 ozs. to the ton. A mill run of the surface ore at Hill's Denver gave the sum of \$1217 to the ton. The extensions to this lode are the Mountain Gem to the north and the Ruby King to the south. The first two have been sold at large figures, and the last named has great promise. The next equally important lode is the Bullion King and Monte Christo, located July 8, and carrying the same massive and rich ores. Each foot of development shows them richer. Late in October the Bullion King lode, at a point 300 ft. from the point of location, was uncovered, and showed ruby and native silver richer than any yet found in the district. The next grand mine of this character is the Lead Chief. It is fairly developed, being opened at four points, showing a steady improvement and concentration of fine streaks and widening of main pay streak as depth is gained of from 3 in. at the surface to 17 in. at the depth of 20 ft. The matter of this lode will steadily run from \$500 to \$1000 to the ton.

In another class of ores are the Big Bonanza and Fourth of July, 6-ft. veins of carbonate of lead and galena, carrying from 30 to 100 ozs. silver, and from 1 to 3 ozs. gold per ton. They come together as the prongs of a fork to its handle—into one grand lode of 12 ft. of the same mineral, named Independence. I could name dozens of other important lodes, but I have confined myself strictly to those whose development entitles them to be classed as the representative mines of the district and of the world. On the divide, to the west, that separates this gulch from Ohio creek are vast fields of bituminous and anthracite coal. An analysis of the bituminous coal made by Mr. William M. Courless (the average of many tons) gave—water, 1.5 per cent.; volatile, 22.8 per cent.; fixed carbon, 67.7 per cent.; streak, almost black ash, 7.0 per cent. The coke amounts to 78 per cent. nearly, and contains 11.4 per cent. ash when the coal is picked. The anthracite is remarkably free from impurities—sulphur, slate, and moisture—and leaves an ash of but 7 per cent. A wagon road from this gulch to Gunnison, twenty-five miles, and one to Crested Butte, seven miles, has been built. The line of the South Park Railroad has been surveyed into the camp, and contracts given out for grading, in the proposals for which rapidity of work was made an element for consideration over lowness of bids. The main town in the camp (Camp Ruby), Irwin, has surveyed in and about it 480 acres, the lots of which are all taken up, and rate at second hand from five to ten times the first cost. A post office is also in operation. About fifty cabins have been put up there by the camps that are developing their mines this winter.

As to the method of getting to the Gunnison county Mr. Boucher gives the routes from railroad termini, and names the best stopping points and distances. From Alamosa and Canon City it is about a three days trip in a light gig or on horseback—it is about 135 miles from the former. A factor that has dignified not only Colorado but the United States is the magnificent work done by the Hayden Commission. But for the comprehensive maps of the Hayden Survey we should be entirely without any geography of this new mineral district, which lies upon the face of its present development the promise of becoming the richest mining camp in the world. Its location is on the Pacific slope, in the Elk Mountain group, between 38½° and 39½° north parallels, and 107 meridian west, and included in Gunnison country, Colorado. Except a flurry of excitement a few (19) years ago, confined to barely a dozen men, who penetrated to Washington Gulch, and washed out many thousands of dollars of gold, where pine stumps, now standing, chopped off from 10 to 20 ft. above the ground, tell in all tongues of the deep snows and hardships they braved for the golden magnet. The district was unpopulated until the year 1878, save by a few trappers and hunters. In 1878 the advanced guard of prospectors moved in, yet the settlement did not reach to 1880. But in 1879 this little leaven proved its working by the constant train of settlement that began pouring in as early as March, and continuing through the season, reaching to as high as 15,000, according to estimates based upon careful observations at leading thoroughfares. The present

season's settlement will prove a vast nucleus for next season's growth, which, according to indications, will reach anywhere from 50,000 to 100,000. The main attraction, of course, is the sterling old motive power of silver and gold, and these are so rich in quality and so bountiful in supply that, in the face of the gilded reports that usually go from new mining camps, it makes one blush to tell the truth of the secrets of the Elk Mountain.

Leadville is vastly rich, and has grown as by the touch of an enchanter's wand. The enormous product of the horizontal deposits of carbonates, and the enormous figures the mines suddenly command, one day to be bought for a few hundreds, and on another day by the turn of a drill worth hundreds of thousands, or millions, seems like a romance of dreamland. But richness is almost its only charm, and probably the average of humanity may think this alone suffices. It is as dreary looking as it is about Central City, or even Pueblo; it is destitute of verdure, and unhealthy. The wild life there that never ceases day, night, or Sunday, is not alone chargeable for the large mortality. There is no vegetation to absorb the unwholesome gases from the smelters, and the exhalations of the city, which brood to the earth in the light air, and sap good health.

The Elk Mountain country is in vivid contrast, with a supply of mineral more prodigal and of greater variety, with the best coal, both anthracite and bituminous, west of Pennsylvania, with timber the largest and most plentiful in Colorado. There are many interesting points that must be passed, and a few passing briefly to be referred to. Regarding improvements, there is a 30-ton smelter at Crested Butte completed; two saw-mills in operation at Gothic, and a 10-ton smelter nearly completed; a saw-mill at the head of Rock Creek, and a large smelter in course of construction (Daniel Harris and Co., of Leadville). The improvements contemplated with the opening of next spring are by the wholesale. The elevations of the several gulches range from 7500 to 9000 ft. The air is dry, clear, electric, invigorating. The day temperature ranges about 60° to 75°. The nights are always cool and sleep promoting, and generally can be depended upon for frost, except from the middle of June until the latter part of August. Such a thing as an enervating condition of atmosphere day or night is unknown. The spring water is cool and delicious; it ministers to thirst and to an epicurean taste. At all times and places is a magnificent landscape of rugged, massive heights and green pasture for the eye to drink in that loves the beautiful; a sweep of beauty that makes time what seemed grand visions from the car window.

The beautiful Elk Mountains are a law and mystery to themselves. They defy science, or at least make science reconcile itself to their individualities. The order of formations frequently will be found reversed, as if there had been some sort of a double somersault in the upheaval days, and such eccentricities as silver lodes yielding coal, and coal bearing silver. The eminent Prof. Geikie, Professor of Geology in the University of Edinburgh, who visited the district this summer, confessed himself bewildered, and his geological lore and theories were drifting out to sea by what he saw.

It were unjust to the mining camps of the Elk Mountains of 1879 to close this article without a tribute to their intelligence, industry, and good morale, the result of which shows in the grand fruitage of their labour. Liquor vendors and other demoralising influences get short notice, and permanent leave of absence. Every man worked, from those rich in the world's goods and honours to the labourer; all worked, and they have shown up a country to be proud of, and one in which the intelligent investment will meet with sure and large reward.

## FOREIGN MINING AND METALLURGY.

The Administration of the Belgian State Railways proposes to give out shortly a contract—or probably a series of contracts—for 100 locomotives for the Belgian State Railways. The reports or representations made to the Minister of Public Works would, if they were fully acted on, justify the Minister in letting contracts for 200 engines rather than for 100. The order now about to be given out must be attended with disadvantageous conditions to the State, in consequence of the great advance which has taken place in the price of raw materials. The Administration of the Belgian State Railways will let next week contracts for 10,000 tons of iron rails, to be paid for partly in old rails and partly in cash. It may be interesting to note that some old rails have been sold this week at Utrecht at 54. 4s. per ton. Prices have been well supported in the Belgian iron trade during the last few days. The current basis price for iron at Liège is 87. 8s. per ton. Plates are quoted in Belgium at 97. 12s. to 107. per ton; but upon these terms the rolling-mills have shown little inclination to accept new orders. Some small transactions in steel rails have taken place in Belgium at 107. per ton; but no large transactions could be carried through on these terms. Pig has been held with firmness in Belgium, but there has been no further advance in prices.

There is little news to communicate with respect to the Belgian coal trade. The strike in the Borinage has terminated, but wages of coal miners are at the same being partially and gradually advanced in the Belgian basins in proportion as the coal trade becomes more active. Belgian coalowners, like their French neighbours, are complaining of a great scarcity of trucks upon railways.

The aspect of the Paris coal market has continued animated. Orders have not ceased to flow in, and their execution has been attended with considerable delays. The arrivals of coal at Paris have been rather irregular, navigation having been interrupted, while the great railways have been almost unable to keep pace with the mass of business which has been offered to them. In the Nord and the Pas-de-Calais coalowners have been complaining of want of trucks, and the general inadequacy of transport facilities. There is little to report with respect to French industrial coal. Deliveries have been attended with some delays.

In the French department of the Haute-Marne the general quotation for rolled coke-made iron is 87. 8s. per ton. Iron from charcoal-made pig has advanced to a less extent, and is now quoted at 97. 16s. to 107. per ton. Plates had not advanced to quite the same extent as iron, but they appear to be now recovering their lost ground. Castings have generally advanced 8s. to 16s. per ton, according to the foundries and according to the articles produced. The iron founders of the Haute-Marne and the Meuse have held a meeting, and have determined on a common tariff, comprising all the principal articles, and fixing a basis price for each; this price shows an advance of 16s. to 32s. upon the old rates. Under all the circumstances this may be considered a relatively moderate advance. In the Nord, in presence of the dearth of pig, the advance which has taken place in coal and coke, and the abundance of orders received, a quotation of 87. 8s. per ton has been unanimously fixed for iron. Before the close of this month this quotation is expected to be carried to 87. 16s. per ton. In the Nancy district in the Meurthe-et-Moselle refining pig has stood at 37. 8s. per ton, but now business is not done at less than 37. 12s. per ton. No. 3 pig for second fusion has been carried to 47. 8s. per ton in the Nancy group. In the Longwy group No. 3 pig has been selling at 47. per ton; contracts of some importance have been concluded upon these terms. In the Ardennes prices are tending upwards, in consequence of the numerous orders received.

## THE BIRMINGHAM WIRE GAUGE.

The Committee of the Society of Telegraph Engineers have just issued their report,\* and although they have not suggested a definite standard, they have brought together information and facts which will greatly facilitate uniformity being ultimately arrived at. The committee have evidently devoted a large amount of time to the consideration of the question, and although it is probable that after mature discussion the millimetre instead of the centimetre will be adopted as the unit, so that wire may hereafter be denominated, in all countries in which commercial intercourse with England, America, France, and Germany is carried on, according to the millimetre standard—all being quoted MWG. The serious inconvenience to which both buyers and sellers are put by the present absence of uniformity—and what is still worse—absence (except in the case of the French gauge) of any definite basis or unit will be readily understood by the mere enumeration of a few of the gauges in simultaneous use or proposed in the same markets. There are the Birmingham, which is not uniform (different makers having different notions as to which really is the old Birmingham gauge), the Dillingen, the French, the Straß, the Wyth, the Cocker, the Ryland, the Whitworth, the Walker, the Watkins, the South Staffordshire, the Mallock and Preese, the American, the Clark, the Briggs, the Hughes, the Bergisch. The "numbers" are in most cases quite arbitrary, and in others are practically incapable of expression by measurements except in the works in which they are made.

The British Board of Trade have given much attention to the subject, and in their last report say—"The question was also adverted to of establishing in this country a standard gauge for use in all trades, or one by which the various gauges of manufacturers might be verified. The question is one to which the Board of Trade are prepared to give favorable consideration as soon as they are further informed on the subject." The same department by mere mention of the matter has shown that the Birmingham gauge is little more than a myth, for they state that "there is no standard of such gauge or common agreement amongst those interested as to what are the dimensions in parts of an inch in the several sizes or sizes of the true BWG. Its sizes are not geometrically or arithmetically progressive (that is to say, if No. 3 BWG be ¼ in., and No. 11 BWG be ¼ in., there is no known method of calculating the size of the other numbers), and consequently bear no definite relation to each other. Its origin is obscure, and it would appear that the several sizes or sizes arose from time to time as a new wire or new plate was introduced, and as the exigencies of a particular trade demanded. Considerable annoyance to engineers and pecuniary loss to contractors is stated to occur from a want of accuracy in the copies of this gauge, and the necessity of establishing a standard has lately been discussed both in this country and in the United States."

Information was also collected by the Board of Trade from Germany, Russia,

\* London: E. and F. N. Spon, Charing Cross.

Canada, France, America, and elsewhere, and it seems that the only attempt which has yet been made, except in France, to secure anything like a rational system has been in the United States, where a committee of the American Institute recently recommended the adoption of the system of expressing sizes in thousandths of an inch, as in the Whitworth gauge, or in fractions of a millimetre. The latter of these recommendations is alone worthy of consideration, since the use of the Whitworth gauge or any other system of measurement which takes the inch as the basis of calculation would practically limit the use of the gauge to England and America, because the circumstance of an inch being a unit of measure in Germany, Sweden, and many other countries, and the German, Swedish, and other inches differing in length from those of England and America, as well as from each other, would lead to such inextricable confusion that no legislator in those countries would dare to propose it. With the millimetre the case is entirely different; it is a measure as well known, though not as much used, as the ordinary measures of the countries in England, America, Russia, Germany, Sweden, and, in fact, wherever modern science is cultivated; it would merely involve the adoption of an additional measure without in any way interfering with those already in use, so that while an acknowledged inconvenience would be overcome no new one would be created in its place.

The whole trade, as well as all users of wire and plates, are undoubtedly indebted to the Society of Telegraph Engineers and to Mr. W. E. Ayrton, the chairman of their editing committee, for the very large amount of information they have furnished in their report, especially as they have appended to it several valuable tables showing the relation of the numerous gauges to the inch and to each other (which, by the way, would alone be sufficient evidence that something should at once be done in the matter), and the papers of Mr. C. V. Walker, F.R.S., read before the Society of Telegraph Engineers, and of Mr. Latimer Clark, M.I.O.E., read before the British Association in 1867 and 1869. The reader is thus enabled to grasp the whole subject with facility, and it may be hoped that the result will be to see the French system of measurement of wire and plates, which is at once rational, definite, and simple, become universal, which will be to the obvious advantage of all concerned.

**STOCK AND SHARE ALMANAC.**—An annual calculated to be of great utility to investors and speculators has been issued by Messrs. John Abbott and Co., of Palmerston Buildings. The almanac is of convenient pocket-book form, and contains a good diary, a week to an opening, and a large amount of information as to the principal securities usually dealt in. There are also particulars as to the rules and practice of the principal foreign bourses, and have offered some useful observations on the system of options carried on so extensively on the Paris Bourse, as they consider them worthy of introduction in the market on a larger scale than hitherto. An option they consider is a great protection both to broker and client, and when universally introduced may to a great degree be the means of diminishing the disastrous effects of panics. The value of the almanac will be widely appreciated.

**INVENTORS' ALMANAC.**—The new edition of this useful sheet almanac, issued by Mr. Ernest de Pass, patent agent, of Fleet Chambers, has just been issued. It is handsomely printed on drawing board from the design of an eminent draughtsman; the usual almanac, which contains also notes of the dates of the birth and death of leading inventors, and of the introduction of important inventions, is surrounded by an ornamental border, in which are shown the various machines and apparatus upon which the progress of our national industries so much depends. The almanac is worthy a place in every engineer's and inventor's office.

**INSTITUTION OF MECHANICAL ENGINEERS.**—The Proceedings of the autumn meeting have just been issued (London: Offices of the Institution, Victoria Chambers, Westminster) and completes the volume for the year. The papers by the Hon. C. Parsons on the Loss of Power in the Screw Propeller and on the means of improving its efficiency, and by Mr. Léon Francq on Fireless Locomotives for Tramways (already fully noticed in the *Mining Journal*) are both well worth study, and the illustrations which accompany them make the descriptions remarkably clear.

**THE DIRECTORY OF DIRECTORS.**—The name of Thomas Skinner is already favourably known to capitalists and investors as the compiler and editor of the Stock Exchange Year Book, and he has now issued an equally valuable work (London: Royal Exchange Buildings) under the title of the Directory of Directors. It embraces about 6000 names, arranged in alphabetical order, and indicates the boards with which each gentleman is connected as director. The Directory forms a neat little volume, and will be invaluable to a large number of readers.

**"HOW TO MAKE MONEY BY PATENTS."**—This being a problem which nine out of every ten who have interested themselves in invention have failed to solve to their own advantage, such a volume as that of Mr. CHARLES BARLOW, bearing the above title, and which supplies them with the necessary information, must certainly prove invaluable; and as the sixth edition has now been issued (London: E. Marlborough and Co., Old Bailey) it may be presumed that the facts which he supplies have been widely appreciated. Mr. Barlow very truly says that many good and practical improvements are so unskillfully set forth as to appear theoretical and chimerical. The patentee, he says, has already put his hand to the plough, and must not look back. The field is before him which by cultivation may yield good returns; but although he may have sown good seed, care will be requisite for bringing it to perfection. Mr. Barlow offers no nostrum to make all patents profitable, and has no alchemy at command to transmute old ideas and schemes into subject matter for new and profitable patent privileges. Mr. Barlow fairly and honestly discusses the various questions of interest to the public and intending patentees, and for this reason it may be anticipated that his book will be extensively read. But apart from his book it has now been pretty well ascertained that patentees have most frequently themselves to thank both for their loss of time and temper, and want of success. The inventor is usually obstinate and egotistic to a degree which is only equalled by his ignorance of what has previously been done by others in the same direction; he is usually too mean or conceited to consult a competent and reliable patent agent, and to pay him adequately for a rule he will not pay at all for searching the record of previous inventions, and reporting on the points in the supposed new invention which appear to have been anticipated; and he is usually far too exorbitant in his demands upon those who may feel disposed to test the value of his yet untried invention. To paraphrase the well-known proverb, and say "A man who is his own patent agent has a fool for a client," would be strictly true, and it might be added that for the patent agent's services to be of any value he must be sufficiently paid for placing the intending patentee in a position to determine the novelty and utility of his invention. A comparatively small extra payment to a patent agent would often save enormous losses and much bitter disappointment.

**TRUBNER'S LITERARY RECORD.**—The December number of Trübner's American and Oriental Literary Record contains an interesting article on Gutenberg and the History of Printing. Among the Literary Notices the issue of Schlagintweit's India Illustrated in 35 folio numbers, at 1s. 6d., is announced. As the volume will contain about 400 illustrations printed from clichés of engraving in books of great price, it will form a handsome and acceptable work. A Synoptic edition of the Lex Salica is also announced, with notes on the Frankish words, by Prof. Kern, of Leyden University. The Obituary contains notices of Von Schiefner, Solovieff, Mr. John Blackwood, and several other celebrities connected with the literary world.

**THE FORMATION OF DIAMONDS.**—An extraordinary theory as to the formation of diamonds is attributed by the Indianapolis Herald to Dr. W. B. Fletcher. One of the doctor's frogs escaped from his reptile menagerie, and when subsequently discovered was found starved to death, and shrunk to half its former size, which is not surprising (although so much has been heard of the power of frogs to fast for an indefinite period), but the curious matter is that the doctor affirms that upon dissection the lungs were found to be clogged up with thousands of black granules like coarse gunpowder. These were placed under the microscope, and proved to be incipient diamonds—that is to say, they were crystals of pure carbon, presenting the regular facets of the stone, into which in course of time, it is presumed, they would have been transformed. It may be suggested that a simple way of putting the matter to the test would be to let the deceased reptile alone to perfect the process commenced. Unfortunately it is, the doctor imagines, the work of ages. He fancies that ages ago antediluvian creatures have died from want of food and water just as his frog has done, and that a similar disease has been set up in their lungs, resulting in the formation of carbon crystals—big ones in the case of very big reptilia, and small ones in the case of the small. It is remarked that it is a pity the process cannot be observed throughout, and that for the sake of posterity it might be worth while to let Dr. Fletcher's frog go on with his process, and take his own time about it, a tablet or some other device being provided to record his stage of progress when discovered last year.

**STEEL, FILE, AND SPRING WORKS, SHEFFIELD.**—Mr. Wilfred A. Matthews, who during the past six years has taken an active management of the business of Messrs. Turton Brothers, has been admitted a partner in the firm. They hope this step will enable them to meet the general extension of the business of Messrs. Turton Brothers and Matthews.





PARIS EXHIBITION, 1878.

GOLD AND SILVER MEDALS AWARDED for  
Steam-Engines & Boilers, also the Special Steam Pump,  
and Compound Pumping Engine.

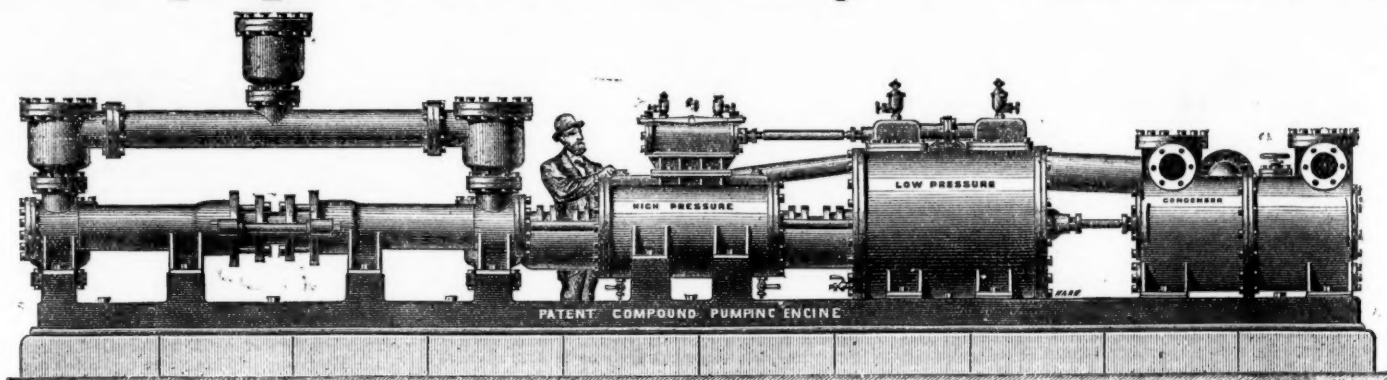


TANGYE BROTHERS AND HOLMAN,

CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,  
AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

TANGYE'S DIRECT-ACTING  
COMPOUND PUMPING ENGINE,

For use in Mines, Water Works, Sewage Works,  
And all purposes where Economy of Fuel is essential.



TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE, WITH AIR-PUMP CONDENSER.

TANGYE'S COMPOUND PUMPING ENGINE COMBINES SIMPLICITY, CERTAINTY OF ACTION, GREAT ECONOMY  
IN WORKING, COMPACTNESS, AND MODERATE FIRST COST.

This Engine will be found the most simple and economical appliance for Mine Draining, Town Water Supply, and General Purposes of Pumping ever introduced, and as regards Mine Draining, the first cost is very moderate compared with the method of raising water from great depths by a series of 40 or 50 fm. lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pitwork, are required, while they allow a clear shaft for hauling purposes. In this Engine the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere.

The following first-class Testimonials will bear evidence as to the efficiency and economy of the Engine :—

TESTIMONIALS OF TANGYE'S COMPOUND PUMPING ENGINE.

21" Newcastle and Gateshead Water Company, Newcastle-on-Tyne, Oct. 20, 1879.  
36" x 10" x 48" COMPOUND CONDENSING STEAM PUMPING ENGINE.  
Messrs. Tangye Brothers.  
GENTLEMEN,—In reply to your enquiry as to the efficiency of the two pairs of Compound Condensing Engines recently erected by you for this company at our Gateshead Pumping Station, I have great pleasure in informing you that they have far surpassed my expectations, being capable of pumping 50 per cent. more water than the quantity contracted for; and by a series of experiments I find they work as economically as any other engine of the compound type, and will compare favourably with any other class of pumping engine. By the simplicity of their arrangement and superior workmanship they require very little attendance and repairs, and the pumps are quite noiseless. A short time ago I had them tried upon air by suddenly shutting off the column, and found they did not run away, thus showing the perfect controlling or governing power of the Floyd's Improved Steam-moved Reversing Valve. I will thank you to forward the other two pairs you have in hand for our Benwell Pumping Station.  
Yours respectfully,  
JOHN R. FORSTER, Engineer.  
(Signed)

21" The Chesterfield and Boythorpe Colliery Company (Limited),  
Registered Office, Boythorpe, near Chesterfield, Oct. 1, 1879.  
36" x 12" x 48" DOUBLE RAM COMPOUND CONDENSING STEAM PUMPING ENGINES.  
Messrs. Tangye Brothers. Supplied in January, 1878.  
GENTLEMEN,—Referring to the above, which we have now had working continuously night and day for the last 12 months, we are glad to say that it is giving us every satisfaction. It is fixed about 400 feet below the surface, the steam being taken down to it at pressure of 45 lbs. per square inch. We can work the pump without any difficulty at 28 strokes per minute—224 ft. piston speed. The pumping power is enormous. The vacuum in the condenser being from 11½ to 13 lbs. The pump is easily started, and works well and regularly. The amount of steam taken being much less than we anticipated. We consider the economy in working very satisfactory indeed. The desire for power and economy at the present day will certainly bring this pump into great requisition.  
Yours truly,  
M. STRAW, Manager.  
(Signed)

SIZES AND PARTICULARS.

	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Diameter of High-pressure Cylinder.....In.	8	14	14	18	18	18	18	21	21	21	21	24	24	24	24
Ditto of Low-pressure Cylinder.....In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Ditto of Water Cylinder.....In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Length of stroke.....In.	24	24	24	24	24	24	24	24	24	24	24	30	36	36	36
Gallons per hour approximate.....	3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450	35,225
Height in feet water can be raised with 40 lbs. pressure per square inch in Non-condensing... cylinder.....	360	330	160	360	250	184	140	360	264	202	130	360	275	175	122
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234	162
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	203	203

CONTINUED.

	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30	30
Diameter of High-pressure Cylinder.....In.	16	28	28	28	32	32	32	32	36	36	36	42	42	42	52	52
Ditto of Low-pressure Cylinder.....In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	12	14
Ditto of Water Cylinder.....In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	12	14
Length of stroke.....In.	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate.....	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,950	35,225	47,950
Height in feet water can be raised with 40 lbs. pressure per square inch in Non-condensing... cylinder.....	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562	
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352	750	
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	191	750	486	337	248	660	450	337	864	600	440	937	

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

NORTHERN DEPOT:—TANGYE BROTHERS, St. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.



TWO GOLD MEDALS.



SOLE MAKERS—

The **LEEDS FORGE CO., Ltd.**,  
Leeds, Yorkshire.

# FOX'S PATENT CORRUGATED FURNACE FLUES,

NOW APPLIED TO OVER

**1000** IND. **00** H.P.

PARIS, 1878.



PRICE LISTS AND  
PARTICULARS  
ON APPLICATION.

Awarded Gold Medal, Paris Exhibition, 1878.

## HADFIELD'S STEEL FOUNDRY COMPANY.



FIRST PRIZE MEDALS AT LEEDS, MANCHESTER, AND  
WREXHAM EXHIBITIONS, 1875 AND 1876.

ATTERCLIFFE, SHEFFIELD,

DEVOTE THEIR EXCLUSIVE ATTENTION TO THE MANUFACTURE OF

**CRUCIBLE STEEL CASTINGS,**

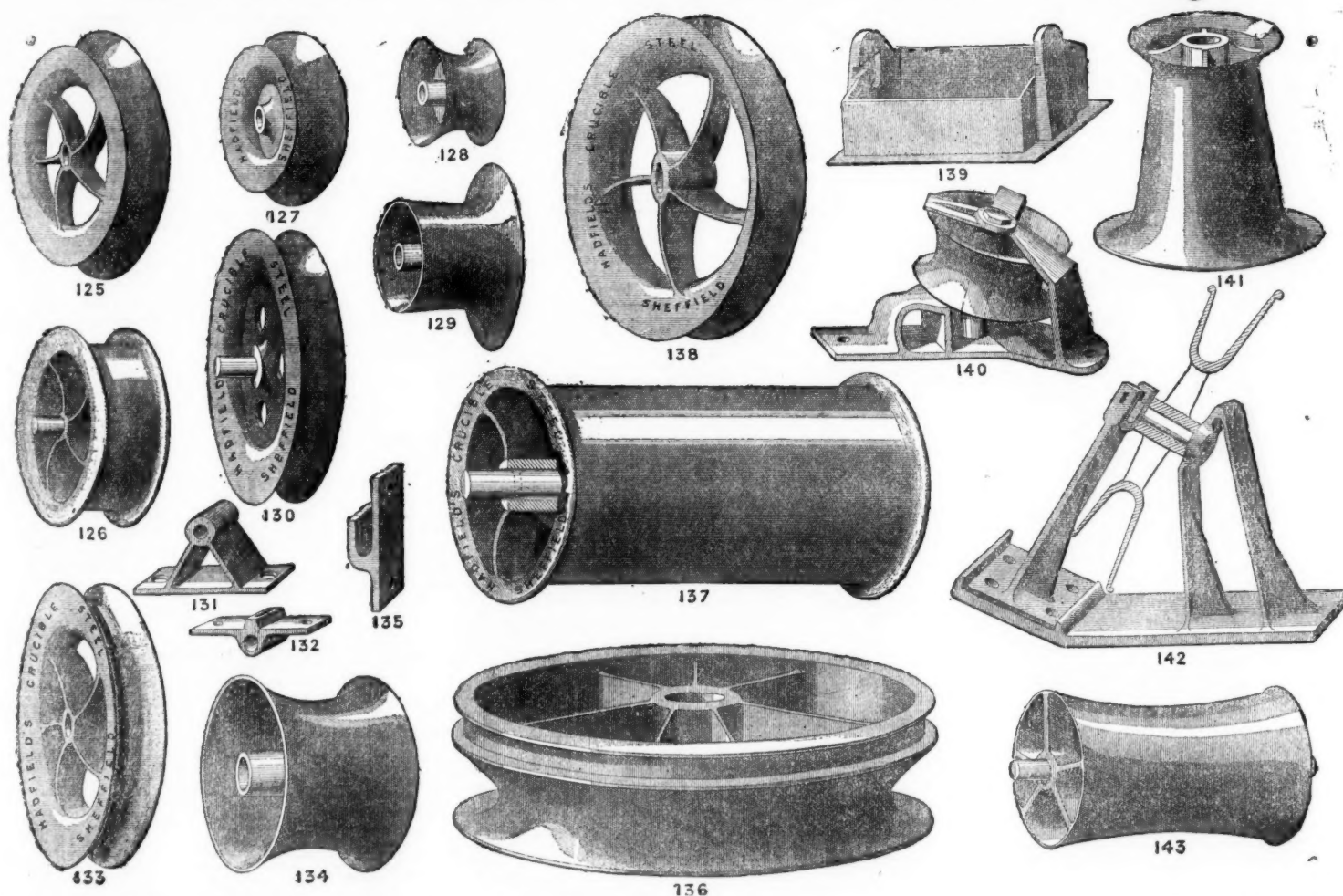
FOR

Engineering & Mining Purposes,

AND ARE THE SOLE MAKERS OF



### Hadfields Steel Rollers and Pulleys.



This Advertisement is varied from time to time.

The following are some of the advantages claimed by the above Rollers and Pulleys:—

- 1.—**LIGHTNESS.**—They are cast by us from one-third to one-half lighter than cast-iron.
- 2.—**SAVING OF HAULAGE POWER AND WIRE ROPES.**—Our Pulleys and Rollers, being extremely light, they effect a great saving in haulage power, and considerably prolong the life of wire ropes. As our Rollers and Pulleys are equally balanced, and never lobb-sided, the instant the rope or chain touches they readily revolve, and all grinding or sawing by the rope is avoided.
- 3.—**STRENGTH.**—Although extremely light they cannot be broken by ordinary means—say by the sudden passing of chains over them, such as frequently connect the rope to the wagon, or hang loose from the end of the passing wagons.
- 4.—**DURABILITY.**—One of our Crucible Steel Rollers or Pulleys will outlast about TWELVE IRON ONES.
- 5.—They reduce wear and tear to a minimum, and are a great saving in working expenses.

FOR LIST OF PATTERNS, SIZES, AND WEIGHTS, SEE LISTS No. 7. FOR ROLLERS AND No. 7A FOR PULLEYS.

**MACHINE MOULDED STEEL GEAR WHEELS OF EVERY DESCRIPTION.**

**JOHN WILLIAMS AND CO.,**  
WISHAW, SCOTLAND,

MANUFACTURERS OF ALL KINDS OF

Cut and Lath Nails; Joiners', Moulders', and Flooring Brads; Copper and Zinc Cut Nails; Colliery Plate Nails; Washers, Boiler Plates, Tube Strips, Sheet Iron for Galvanising and other purposes.

PRICE LIST ON APPLICATION.

**YEADON AND CO.,**  
LEEDS,

**ENGINEERS, CONTRACTORS, &c.**

FOR EVERY DESCRIPTION OF PLANT FOR

Collieries, Mines, Brickworks, &c.

[This Sheet of Drawings is Copyright.]



At the PARIS EXHIBITION the Jurors have Awarded

# THE GOLD MEDAL, THE SILVER MEDAL, AND HONOURABLE MENTION FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

## H. R. MARSDEN,

ORIGINAL PATENTEE AND SOLE MAKER OF BLAKE'S

# Improved Patent Stone Breakers & Ore Crushers.

New Patent Reversible Jaws,  
in Sections, with Patent  
Faced Backs.

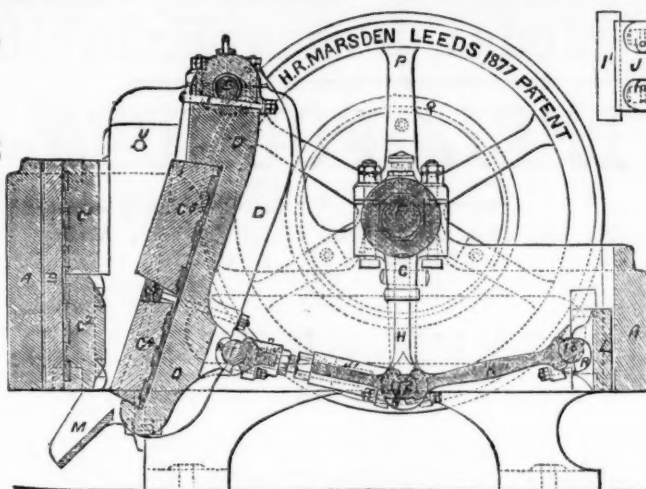
NEW PATENT ADJUSTABLE  
TOGGLES.  
OVER 2500 IN USE.

New Patent Draw-back  
Motion.

NEW PATENT STEEL TOGGLE BEARINGS.

70

PRIZE MEDALS.



### READ THIS—

Wharhole Lime Works, Maryport, Whitehaven,  
November 7, 1873.  
H. R. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.  
DEAR SIR,—The machine I have in use is one of the large  
size, 24 in. by 12 in. The quantity we are breaking daily with  
this one machine is 250 tons, the jaw being set to break to a  
size of 3½ in. We have, however, frequently broken over  
300 tons per day of ten hours, and on several occasions over  
350 tons during the same period. The stone we break is the  
blue mountain limestone, and is used as a flux in the various  
ironworks in this district. We have now had this machine in  
daily use for over two years without repairs of any kind, and  
have never had occasion to complain of any inconvenience in  
using the machine. I hope the one you are now making for  
me may do its work equally well. The cost—including  
ENGINE-POWER, COALS, ENGINEMAN, FEEDING, and all EXPENSES  
OF EVERY KIND—is just 3d. per ton. Should any of your  
friends feel desirous of seeing one of your machines at work,  
I shall have much pleasure in showing the one alluded to.  
I am, dear Sir, yours very truly,  
WILLIAM MILLER.

### AND THIS—

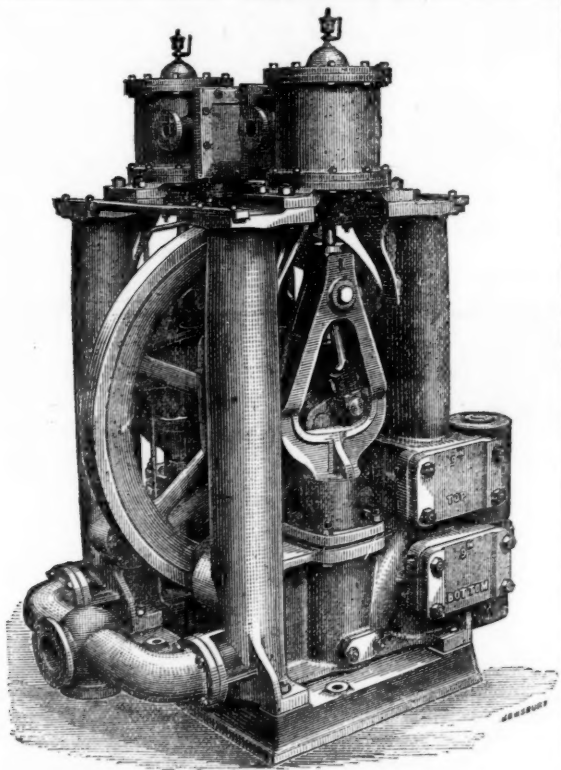
Wharhole Lime Works, Aspatria, Cumberland,  
July 11th, 1878.  
H. R. MARSDEN, Esq., Soho Foundry, Leeds.  
DEAR SIR,—We are in receipt of your letter of 4th inst. I  
may just state that the stone breaker above named has been  
under my personal superintendence since its erection, and I  
have no hesitation in saying that it is as good now as it was  
five years ago.  
I am, dear Sir, yours faithfully,  
FRANCIS GOULD.

GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

CATALOGUES, TESTIMONIALS, &amp;c.

H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.



STEAM PUMPS for COLLIERY PURPOSES, specially adapted  
for Forcing Water any height; also for Sinking; and for Feeding  
Boilers.

JOHN CAMERON has made over SIX THOUSAND.

WORKS: OLDFIELD ROAD, SALFORD, MANCHESTER.

SILVER MEDALS AWARDED AT CORNWALL POLYTECHNIC  
1872 AND 1876.

THE WELL-KNOWN PATENT SELF-ACTING ORE  
DRESSING MACHINERY, as in operation at most of the  
large Mines in the Kingdom and Abroad, is now supplied solely by  
THE PATENTEE AND MANUFACTURER, Mr. GEORGE GREEN,  
Mining Engineer, AT GREATLY REDUCED PRICES; also all  
descriptions of Mining Machinery, including  
GOLD AND SILVER AMALGAMATING MACHINERY, complete.

Stamp Mills, Water Wheels, Steam Engines, &c.

ROLLER SHELLS FOR CRUSHING MILLS—a speciality.

SPECIAL DESIGNS FOR EXPORT AND DIFFICULT TRANSIT.

Prices and particulars on application to the Manufactory,  
ABERYSTWITH, SOUTH WALES.

THE GREAT ADVERTISING MEDIUM FOR WALES.  
THE SOUTH WALES EVENING TELEGRAM  
(DAILY), and  
SOUTH WALES GAZETTE  
(WEEKLY), established 1857.

The largest and most widely circulated papers in Monmouthshire and South  
Wales. Chief Offices, NEWPORT, Mon.; and at CARDIFF.

The "Evening Telegram" is published Daily, the First Edition at 3 P.M.; the  
Second Edition at 5 P.M. On Friday, the "Telegram" is combined with the  
"South Wales Weekly Gazette," and Advertisements ordered for not less than  
Six Consecutive Insertions will be inserted at an Uniform Charge in both papers.  
P.O.O. and Cheques payable to HENRY RUSSELL EVANS, 14, Commercial-street,  
Newport, Monmouthshire.

THE NEWCASTLE DAILY CHRONICLE  
(ESTABLISHED 1754).  
THE DAILY CHRONICLE AND NORTHERN COUNTIES ADVERTISER,  
Offices, Westgate-road, Newcastle-upon-Tyne; 50, Howard-street, North  
Shields; 195, High-street, Sunderland.

## THE "CHAMPION" ROCK BORER

MINE AND QUARRY STANDS, STEEL DRILLS, SPECIALLY PREPARED INDIARUBBER HOSE, TESTED  
IRON PIPES, &c.



## Air-Compressing Machinery,

Simple, strong, and giving most excellent results, and

## ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected  
by this machinery, on application.

R. H. HARRIS, late

ULLATHORNE AND CO., Mechanical and Consulting Engineers,  
43, QUEEN VICTORIA STREET, LONDON, E.C.

HIGHEST AWARDS:



PARIS EXHIBITION, 1878.  
YORK EXHIBITION, 1879.

SALMON, BARNES, & CO.,

MANUFACTURERS OF THE PATENT

ROANHEAD ROCK DRILL,

ALSO OF

ATKINSONS PATENT



PARIS EXHIBITION,  
1878.

## FEEDWATER HEATER.

FULL PARTICULARS AND PRICES ON APPLICATION.

Canal Head Foundry and Engineering Works, Ulverston,  
LANCASHIRE.

GOLD MEDAL AWARDED, PARIS EXHIBITION 1878.

THOMAS TURTON AND SONS,

MANUFACTURERS OF

MINING STEEL of every description.

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